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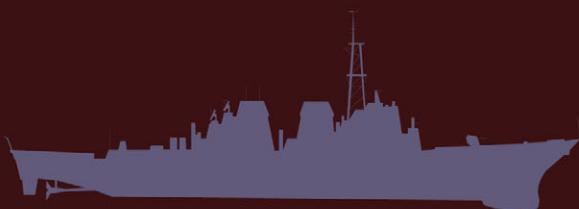
Volume 23, No. 2
February 2004

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Vol. 23, No. 2

February 2004

Cover Story**Monitoring the South American Military**

By Ron Peron

HF utility monitors who want a change of pace have only to turn their antennas toward South America to find interesting and challenging communications networks. Best of all, if your Spanish isn't up to deciphering the voice nets, there is a wealth of information to be had by monitoring the ALE digital networks and translating at your leisure.

Here are the results of the author's reception of military communications from Mexico, Venezuela, Brazil, and Ecuador. Story starts on page 12.

Cover design by Bill Grove.

Domestic SW Broadcasting in Russia 16

By Bernd Trutenua

Shortwave frequencies registered with the HF Coordination Conference still reflect the independent broadcasting boom in post-Soviet Russia, but sadly, the truth is somewhat different. Here is a more realistic winter broadcast schedule along with the addresses of active stations.

Tales of Two Frequency Clashes 19

By Rimantas Pleikys and Sigitas Zilionis

If broadcasting on frequencies which are not assigned to it qualify a station to be labeled "clandestine," then two of the biggest such operators have been Voice of America and Voice of Russia. Since its motivation is usually political, the station may not go away until the world situation changes. Two cases prove the point.

Scanning Salt Lake Center ARTCC 20

By Jon Van Allen

Salt Lake Center controls the largest geographic airspace in the lower 48 states, as well as providing approach / departure services for a number of airports within its jurisdiction. Tune in to these frequencies and listen to skilled controllers at work.

Save Your Local Airport! 22

By Rachel Baughn

The Southeast SATSLab Consortium has a vision for the future of aviation which would relieve the congestion of major hubs and restore the importance of small local airports. One such experiment is on trial at an airport in *MT*'s back yard, so come along with us for a visit.

Air Traffic Control Simulcasting 24

By Iden Rogers

Understanding more about air traffic control and how it accommodates varying traffic flow is key to answering a common query: Why can't I hear all the aircraft being worked, even though I can hear the controller?

Service Search 25

By Larry Van Horn

Highway maintenance service allocations.

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Fax: (828) 837-2216 (24 hours)
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Owners

Bob and Judy Grove
judy@grove-ent.com

Publisher

Bob Grove, W8JHD
bobgrove@monitoringtimes.com

Managing Editor

Rachel Baughn, KE4OPD
editor@monitoringtimes.com

Assistant Editor

Larry Van Horn, N5FPW

Art Director

Bill Grove

Advertising Svcs.

Beth Leinbach
(828) 389-4007
beth@grove-ent.com

Reviews:

Of special interest to drivers is the **Uniden BCT8** scanner, with its preprogrammed service channels, police vehicle alert, and trunk tracking ability – an impressive radio, says Bob Parnass (page 78). John Catalano wraps up his review of **Digital Radio Mondiale** monitoring and summarizes his findings on page 80.

A couple of accessories well worth checking out are the **MFJ Travel Tuner**, reviewed by Bob Grove on page 82, and the **PowerPort GearHarness**, reviewed on page 83 by Skip Arey.

Jock Elliott reviews a book appropriate to any season – *How to Survive Any Storm*, written by well-known storm expert Warren Faidley (see page 86). This is one book you'll want to keep within easy reach. See more book reviews in *What's New* on page 88.

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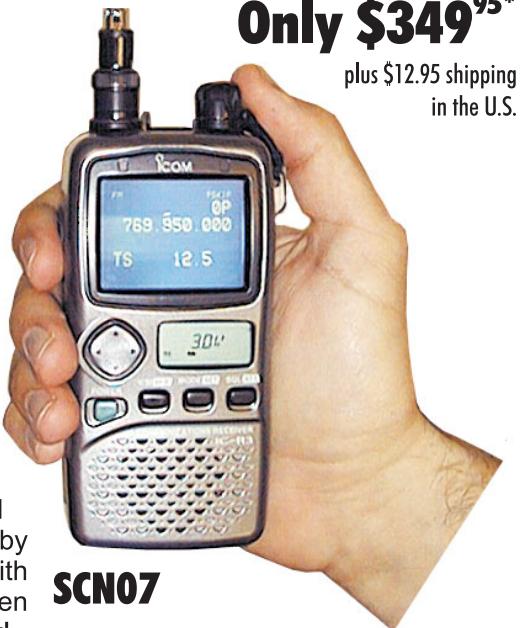
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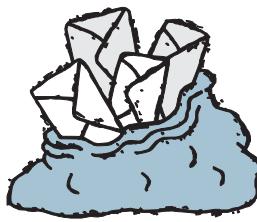
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LETTERS TO THE EDITOR

The Evolution of MARS

After receiving his December issue of *Monitoring Times* and the invitation for a discussion on the Military Affiliate Radio Service in *MT*, Ron Perron suggested, "Why not go one step further? Take the lead and host a 1-2 day symposium on the subject and invite your colleagues at *Popular Communications* and *QST* to join you as hosts. Invite the Commanding General of MARS along with some of his minions (civilian & military) to address the issues and join in a discussions and deliberations on how to make MARS better. Such an open forum I'm sure would entice many in our hobby to attend and add to the discussions."

While we're very flattered by Ron's confidence in *MT*'s strength of influence (not to mention deep pockets and unlimited staff), I hasten to say *MT* is not on a crusade against MARS. Having made our point, and giving our readers a chance to weigh in, we will leave the subject for at least another year to take up other radio topics. This month we print a statement from Dino Papas, KL0S/AAT3BE/AAA9TC, US Army MARS National Training Coordinator, in our *Closing Comments* on page 92, and below are other reader comments, plus a final statement on this issue from *MT* Assistant Editor, Larry Van Horn.

"I read the article written by Larry Van Horn, N5FPW and find it quite interesting. I agree that MARS needs a major shake up. When I joined I ask for assistance in passing my training phase but to no avail. They give you 6 months. Needless to say I resigned before I even really got started, within 4 months. Training officers in the PA MARS group would not return emails or phone calls. Being a military veteran I thought I would try helping our military but that didn't work out well.

"I have been in emergency services since 1961 and have never been treated like I was not needed until I joined PA Army MARS.

"Aside from MARS taking lessons from the ARRL, they should take a good look at our local communities across the country. Volunteer emergency services are the back bone of the country.

"They are the people, (the First Responders) that keep this great country up and running. No unions to deal with, no taxpayer dollars are invested in their training and these wonderful people give millions of hours on a year to year basis away from their families serving their communities.

"As I have seen, the only taxpayer money going to MARS is to support headquarters, the volunteers pay for their own equipment, I.E.: The Hams."

—Jim Roble, N3BRS, Emergency Management Coordinator; Retired Fire Chief, Ambulance Commander, and Law Enforcement Officer

"Perhaps Tomas [Tomas Hood, NW7US (AAR0JA/AAM0EWA) Letters, Dec 2003] can provide specifics detailing an actual emergency

communications support role assigned to MARS by JDOMS or other national interests, or of an actual emergency communications support operation in which MARS provided portal to portal support. Opening a net and saying that this constitutes actual emergency communications support operation without actually having provided direct support is, according to the recent DAIG investigation report, misleading and deceptive. The criticism stems from just such misleading and deceptive statements regarding past support or actual customers. ARES and RACES can provide verifiable specifics regarding actual support operations.

"The DAIG investigation included a ten year scan of FEMA reports looking for a bona fide MARS support report and found none. Inferences and closed circuit internalized exercises favored by MARS, in which participants largely talk to themselves, hardly qualify as either preparing for or providing actual support."

—Al Uvietta, kc5s@arrl.net

"Enjoyed your comments in the October *Monitoring Times* article. As a 30 + year army MARS member, I tend to agree with your conclusions. However, I did read the DAIG report (which I don't have handy at this moment) and in it, they cite the specific steps that MARS has to follow in order to support a Civil agency. This procedure is mandated by a federal law.

1st, the Governor of the state(s) involved has to utilize all existing emergency state resources.

2nd, the governor(s) then request the President to declare an emergency.

3rd, the President declares an emergency.

4th, at this point a Federal emergency response team headed by FEMA kicks in.

5th, FEMA calls upon DoD for appropriate assistance.

6th, DoD exhausts its active duty resources.

7th, DoD tasks the various MARS chiefs for assistance.

"During the emergencies you cite in your article, to my knowledge, DoD never requested MARS assistance. While we individual MARS members are willing to participate as required, we weren't called upon. Indeed, according to the above procedure, my view is that to respond to a bona fide emergency, our chances to do so are very near ZERO.

"As I see it, our MARS management needs to clarify/validate the above procedure so that the members understand more precisely when they are to react. Awhile back, this topic was introduced on the 'Question of the Week' (an informal Chief, Army MARS weekly net) and unfortunately the response was somewhat ambiguous and left the impression that the federal law didn't apply to MARS.

"Currently the only mission I see we have is to provide domestic intelligence reports to DOMS/JDOMS in the form of EEI reports. That being the case, MARS may well be better served by being incorporated within one of the Intelligence services.

"In summary I'd say if your intent was to create a little internal 'soul searching' within MARS, you were successful. Whether or not the MARS leadership will so do, remains to be seen."

—Jack Finch

I want to thank everyone who has responded publicly and privately to my editorial in the October 2003 issue of *MT* - *Can't lead From Behind*. I am glad to see that most responders have resorted to constructive, responsible dialogue as a result of our editorial comments.

Unfortunately, I cannot say the same for the leadership of the Army MARS program. Shortly after our editorial hit the newsstand the item below was broadcast nationwide by the Chief of Army MARS, Robert Sutton, on his Friday night Chief's HF radio net.

ITEM # 8: ATTACK ON MARS. We have been notified of a recent article in a tabloid that has once again attacked the MARS programs, all three services. Once again it has not provided accurate information and has not addressed the issues to the MARS Chiefs for validation of the accusations prior to publication. The charges are based upon unidentified sources (as always). It is readily apparent there are some individuals who's only goal is to kill the MARS program. I have also been informed that the author of the article is a HAM, who apparently does not want to recognize that the volunteer MARS programs and the accomplishments are made by HAMs as well. This does not speak well to the amateur radio community nor to the outstanding contributions that our volunteer members have made to the MARS program and the improvements that are continually being made. On the other hand, those that are MARS members and are performing in an outstanding manner know better. Why am I raising this issue? Basically because it appears to be designed to hinder recruitment of potential new members and bias those who have recently joined and have not had an opportunity to find out the facts for them selves. This will be another agenda item at the Chiefs Panel meeting.

I can't help but wonder on what planet in our solar system Mr. Sutton is actually residing? It is quite obvious that Mr. Sutton choose to make these off-the-cuff comments to his membership without even reading Fred Maia's original piece (which was sent to them before publication) or my editorial. Had he read them he would have discovered that our comments were not directed toward the membership and hams in general, but on the program leadership which has failed a great group of volunteers.

So now I have a direct message for the Army MARS leadership: There is absolutely nothing inappropriate about expressing concern about MARS lack of mission compliance. It is largely Mr. Sutton and members of the Army MARS program top management who have characterized these expressions as harmful and designed to de-

stroy the MARS program. Your failed leadership is to blame here, not the individual MARS members.

In another defense of the MARS program, a correspondent pointed to things that MARS should be doing rather than specific emergency communications that MARS actually provided. Somehow, the defenders of the MARS program claim to be engaged in refining procedures, training and exercises. In truth, these never seem to translate into that elusive emergency communications support operation that is the MARS mission statement.

And now looking at Mr. Papas' comments in this month's *Closing Comments*, I differ with Mr. Papas' perspective in several key areas. But instead of taking these on one by one I would rather get to the main concern we have outlined above.

I would challenge Mr. Papas or anyone else in the Army MARS leadership to produce specific instances in which Army MARS provided direct point-to-point emergency communications support for any significant agency (government or civilian) during any recent disaster. And providing Essential Elements of Information (EEI) reports cannot be part of this assessment. EEI messages essentially involves little more than information gathered from broadcast media reports and e-mailing them via the internet to Department of Military Support (DOMS).

So where is the substance? Inferences won't cut it any more.

I must point out that we, the taxpayers, didn't draft the mission statement for the MARS programs, so we do not have to apologize for demanding that these federally funded programs meet their main mission requirements. The American taxpayer is footing this bill and we have a right to have our money put to good use, in programs that work properly, and for the benefit of us all. If the leadership of those programs cannot get it right then it is time to fire them and get someone else who can.

*Larry Van Horn, N5FPW
Monitoring Times Assistant Editor*

Fractal Challenge

Barry Williams forwarded a news story about Penn State developing fractal antennas for broadband network applications. When I mentioned my fascination with the topic, he responded, "Yes, fractals are very interesting. I became interested when the first public programs to create fractals came out around 1986, or thereabouts. They were painfully slow but worth the wait on 8 MHz processors!"

"I thought (too late) of another link that was way off the radio topic, but may mesh with fractal antennas since you are interested, too. It had to do with inkjet printing of ICs. Anyway, I think it is Xerox who has perfected printing techniques on overhead type projection film with inks that print with electrical inks....

"Wouldn't it be a huge step if we could print fractal antennas?! If you could print your antenna pattern at home you could produce some good home/limited space antennas for window mounting, attic mounting, etc. You could also link many sheets of printed antennas, too. Imagine an attic full of linked antenna sheets. I would be interested in printing extremely dense sheets for indoor LF/VLF antennas instead of using a lot of wire. I see another home project brewing now.

"I used to experiment with inks when the first inkjet printer came on the market. Maybe I can find an electrically conductive liquid on the market to inject into ink cartridges. Any help to steer me to suppliers would be appreciated. I remember seeing a product from Caig that is a trace pen. You use the marker type pen to either make or repair traces. Caig is the manufacturer of the famous DeOxit.

"This could be an interesting article in *MT* for space limited hobbyists if it pans out. It should appeal to scanner owners, too, especially in hotel rooms. The possibilities are endless...car window antennas, stealth antennas, artful sheets on the walls, etc. Maybe I can make products with framed line art pictures of Tesla, Einstein, etc that are actually antennas. Oh well, it is fun to think about. (g)"

—Barry Williams

We welcome your ideas, opinions, corrections, and additions in this column. Please mail to **Letters to the Editor**, 7540 Highway 64 West, Brasstown, NC 28902, or email editor@monitoringtimes.com. Letters may be edited for length and clarity.

Happy monitoring!

—Rachel Baughn, KE4OPD, editor

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Monitoring and the Law

May the Law Be With You

The Adirondacks of upper New York conjure up different images for different people but they all have one thing in common – peacefulness. For some, the Adirondacks are the northern part of the Appalachian Mountains, even though they are really, geologically an extension of Canada. Others use the term to refer to the Adirondack Park created in 1892 by the State of New York to conserve water and timber resources in the region.

Today that Park is the largest publicly protected area in the contiguous United States – greater in size than Yellowstone, Everglades, Glacier, and Grand Canyon National Park combined – approximately 6 million acres. Such a peaceful place was an unlikely setting for the latest conflict between amateur radio operators and the government over radio use and possession laws, but last summer that's where the latest battle was waged.

Last May 31st at around three in the morning Richard Lalone, KC5GAX a licensed amateur radio operator, was stopped on his way home from work. Driving during the "magic drunk" hour, when police make many of their drunk driving arrests, Lalone was on his way home from the Fort Drum Army base near Watertown, New York, when he was stopped. Although he was driving below the speed limit, Trooper Rice thought he was wandering in his lane and stopped him to investigate.

As she approached Lalone's vehicle she noticed a single 2-meter antenna on the roof of in addition to the Jeep's AM and FM steel whip antenna. The detail was unremarkable at the moment as she asked the driver for his license and registration. On the dash of the vehicle, though, she noticed a two-way radio – an ICOM 706 MKIIG. The radio was not tuned to any police channel. The Trooper returned to her vehicle to check the license and registration. Richard Lalone turned back to listening to his stereo, which was now receiving some sort of interference. He would later find out the Trooper had left the patrol car's speed radar on and it was apparently interfering with his stereo.

A few minutes later Trooper Rice found Lalone's license and registration in order and returned to his vehicle to send him on his way. As she returned his drivers license and registration, she asked about the radio mounted on the dash, which Lalone was turning on and off in an attempt to discover the source of the new interference.

◆ Guilty Until Proven Innocent

Lalone told her it was a two-way amateur radio and that he was a ham radio operator. "Can it receive police calls?" the Trooper asked. "It's capable of receiving them," Lalone told her.

Remembering her training and that such radios were illegal, Trooper Rice asked Lalone to remain while she investigated this new development. She again returned to her car and using a mobile telephone called her headquarters to double check what she remembered about police radios in vehicles in New York. At headquarters another officer looked up the offense in a Desk Book. The current New York State Police Desk Book contains, among other things, a chart by which officers can quickly look up a summary of the law for most New York Vehicle and Traffic law offenses.

The Officer at headquarters told Trooper Rice that having a radio that can receive radio signals used by the police was a violation of New York Vehicle and Traffic Section 397. What neither Trooper Rice nor the Officer informing her knew, was that an exception in the law for licensed amateur radio operators had not been included in the Desk Book when it was prepared. Lalone and his lawyer would later learn that the New York State Police Desk Book was incorrect.

Trooper Rice returned to the stopped vehicle and informed Lalone that his radio was against the law. Lalone politely protested and explained that he was a licensed amateur radio operator. He showed the Trooper his Federal Communications Commission license and told her there was an exception in the law. However, he did not have a copy of the New York law with him to show the trooper. The Trooper listened to Richard Lalone's explanation, but with the incorrect information she had received from headquarters, she had no choice but to write him a citation for illegal possession of a radio in a vehicle. The Trooper was polite and professional throughout and did not confiscate the radio.

After handing him the citation and explaining to him that he had to appear June 9th in Court to answer the charges against him, she allowed Lalone to leave. Richard Lalone drove home relieved that he was not going to jail and that his radio had not been confiscated, but somewhat confused about the of-

ficer not understanding the law or believing his license exception.

◆ Up in Arms

In the days that followed the stop, Richard Lalone sought out the help and advice of the local amateur community. In the new "town square" of the twenty-first century – the online chat rooms and message boards of the Internet – messages about the encounter flew. Slowly the ham radio community in the area became slightly outraged. Disbelief over the apparent refusal of the State of New York to recognize an exception in the law grew into discontent. Some licensed amateur radio operators even suggested that if the State was going to behave this way they might need stop helping the state when it came to civil defense drills and other emergencies or risk arrest. Suddenly the volunteer communications assistance that the amateur radio community provides in times of emergency in the Adirondacks was in jeopardy.

Through the help of Harry Kohler, by the time Richard Lalone's scheduled court date of June 9th rolled around, he had enlisted the help of attorney Susan Terry. Terry, also a licensed amateur radio operator, was a former prosecutor and Assistant New York Attorney General. She agreed to take on the case *pro bono*, as a public service for Richard Lalone and the amateur community. That meant she would not get paid the several hundred to sometimes several thousand dollars that it can take to defend a case like this.

After conducting her initial investigation of the facts and reviewing the law in New York to insure there were no recent changes, Terry contacted the Assistant District Attorney on the case Dylan Tester. "The law does not apply to Mr. Lalone," she told him. "He is exempt by virtue of his federal license." Tester agreed and considered dismissing the

continued on page 86

Disclaimer

Information in this column is provided for its news and educational content only. Nothing here should be construed as giving specific legal advice. Persons desiring legal advice about their specific situation should consult an attorney license in their jurisdiction.

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Bearcat Sportcat 180B handheld sports scanner.....\$139.95

Bearcat 80XLT 50 channel handheld scanner.....\$99.95

Bearcat 60XLT 30 channel handheld scanner.....\$74.95

Bearcat BCT7 information mobile scanner.....\$139.95

AOR AR16BQ Wide Band scanner with quick charger.....\$199.95

Sangean ATS909 306 memory shortwave receiver.....\$209.95

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1,000 Channels • 20 banks • 50 Select Scan Channels

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Frequency step programmable in multiples of 50 Hz.

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(Full coverage receivers available for export and FCC approved users.)

The AOR AR8200 Mark IIB is the ideal handheld radio scanner for communications professionals. It features all mode receive:

WFM, NFM, SFM (Super Narrow FM), WAM, AM, NAM (wide, standard, narrow AM), USB, LSB & CW.

Super narrow FM plus Wide and Narrow AM in addition to the standard modes. The AR8200 also has a

versatile multifunctional band scope with save trace facility, twin frequency readout with bar signal meter,

battery save feature with battery low legend, separate controls for volume and squelch, arrow four

way side rocker with separate main tuning dial, user selectable keypad beep/illumination and LCD contrast, write protect and keypad lock, programmable scan and search including LINK, FREE, DELAY, AUDIO, LEVEL, MODE, computer socket fitted for

control, clone and record, Flash-ROM no battery

required memory, true carrier reinsertion in SSB

modes, RF preselection of mid VHF bands, Detachable MW bar

antenna. Tuning steps are programmable in multiples of 50 Hz in all modes, 8.33 KHz airband step correctly supported, Step-adjust, frequency offset, AFC, Noise limited & attenuator, Wide and Narrow AM in addition to the standard modes. For maximum scanning pleasure, you can add one of the following optional

slot cards to this scanner: **CT8200** CTCSS squelch & search decoder \$89.95; **EM8200** External 4,000 channel backup memory, 160 search banks. \$69.95; **RU8200** about 20 seconds

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eliminator \$59.95. In addition, two leads are available for use with the option socket. **CC8200A** personal computer control lead \$109.95; **CR8200** tape recording lead \$59.95. Includes 4 1,000 mAh AA ni-cad batteries, charger, cigarette lighter adapter, whip antenna, belt hook, strap and one year limited AOR warranty. For fastest

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IN MEMORIAM

The loss of a parent is always difficult, and is certainly made no less painful by the memories of the holiday season. The editorial and publication staff of *Monitoring Times* extends our heartfelt sympathy to Editor Rachel Baughn in the loss of her mother, Evelyn Thomas, on December 22, 2003.

-Bob Grove, Publisher

Man charged after second rescue by satellite locator

Carl J. Skalak, 55, of Cleveland, Ohio, who was the first person in the continental United States to be rescued by the National Oceanographic and Atmospheric Administration's (NOAA) new Emergency Personal Locator Beacon (PLB) system, has been rescued by the same system again. But there is an interesting twist to his second rescue.

This time he was greeted by law enforcement officers, who charged him with two counts of third-degree falsely reporting an incident. He was arraigned in December 2003 and posted \$10,000 bail.

During his second rescue, a helicopter from Fort Drum military base lifted Skalak out of the Five Ponds Wilderness Area, the site of his November 14, 2003, rescue.

After the first rescue, Skalak said he planned to return to retrieve his canoe and other gear, the *Watertown Daily Times*. That trip led to his arrest, said Stephen W. Litwhiler, spokesman for the New York State Department of Environmental Conservation.

"His latest distress signal prompted a search involving 13 forest rangers, who were initially unable to reach Skalak due to lake effect snows," Litwhiler said. "The next day, DEC officers arrested him," he said.

These new NOAA Personal Locator Beacons become operational on July 1, 2003, and are small-scale versions of those used by boaters and pilots. The beacons emit a signal that can be tracked by a worldwide satellite



search and rescue system when they are activated in an emergency. This signal is picked up by weather satellites operated by NOAA. You can get more information on this new system at <http://www.sarsat.noaa.gov/>.

New Interface at FCC Website

The FCC unveiled on December 14, 2003, a new online filing interface for its Universal Licensing System (ULS), on the web at <http://wireless.fcc.gov/uls>, which includes the Amateur Radio Service.

Among other features, the ULS's new look will include easier-to-read on-screen forms that guide users through filing and simplify such routine tasks as applying for license renewal, address change or vanity call sign. The FCC says the introduction of its new system, called "ULS License Manager," concludes phase one of an ongoing ULS overhaul by the Wireless Telecommunications Bureau.

ULS License Manager will be compatible with most major Web browsers and computer platforms and no longer will require downloading Java and Java Script files.

The ULS will require all filers to log into the system using an FCC Registration Number (FRN) and Commission Registration System (CORES) password. Taxpayer Identification Numbers (TINs) no longer will be accepted for log-in purposes, the FCC said.

There's also a new paper version of FCC Form 605, dated December 2003. One change is that Form 605 no longer requests a date of birth and will only accept an FRN and CORES password. There are no Amateur Service-related changes to any Form 605 schedules. The FCC says Amateur Service applicants may continue to use the March 2001 (or later) edition of Form 605, although it encourages use of the newest version. The new FCC Form 605 now is available via the FCC Web site at <http://www.fcc.gov/Forms/Form605/605.html>.

And More Changes at the FCC

The FCC announced late last year a reorganization of its Wireless Telecommunications Bureau (WTB) "to more effectively support the FCC's strategic goals – broadband, competition, spectrum, media, homeland security and modernizing the FCC." The WTB administers the Amateur Radio Service (Part 97) and amateur licensing, which now will fall within the newly named Public Safety and Critical Infrastructure Division. D'wana Terry, formerly chief of the Public Safety and Private Wireless Division, will head the new division.

In addition to the Amateur Service, the Public Safety and Critical Infrastructure Division will oversee Part 95, Marine, Aviation, Intelligent Transportation Systems, Public Safety Fixed Microwave, Public Safety and Private Land Mobile services and E911,

among other areas. Responsibilities moved elsewhere include Fixed Microwave (Part 101), Instructional Television Fixed Service, Multipoint Distribution Service, and the Multichannel Video Distribution and Data Service.

Nano Radio Invented

Two Cornell University graduate students and a research associate stuck an antenna on the top of their eight-story building, then went back down to their basement laboratory and, after some fiddling, found they could tune in the nearby radio station from Ithaca College.

On October 23, their success translated into a \$25,000 check, a prize in the 2003 Collegiate Inventors Competition.

The three Cornell researchers work in nanotechnology – the art and science of making things that are far smaller than a human hair. Their invention, a tiny, micromechanical oscillator, is much smaller than those now used in electronics. Oscillators, the timing components in electronic circuits, are needed to maintain accurate frequencies.

The invention could lead to devices such as a tiny cell phone that could be mounted on an earring or a smart pill capable of taking readings and sending signals as it moves through your body. The pill would use radio frequency communications so doctors could track it without relying on other means, such as X-rays.

"It's like putting a little cell phone inside your body," said Robert Reichenbach, a 25-year-old graduate student in electrical engineering.

The inventors' competition, which



February 15: Aurora, CO

Aurora Repeater Association Hamfest at the Adams County Fairgrounds (US 85 north, take East 124th Road West and it becomes Henderson Road when you pass Brighton Road; Fairgrounds are to the north); Talk in 147.15 (+); 9 a.m.; admission \$4. VE Testing at 10 AM by Mile High VE Team. Contact Wayne Heinen N0POH for more info 303-699-6335 email n0poh@arrl.net; Aurora Repeater Association, P.O. Box 471802, Aurora, CO 80047-1802

February 29: Hicksville, NY

Long Island Hamfair and Electronics Show Winterfest sponsored by the Long Island Mobile Amateur Radio Club (LIMARC). Levittown Hall at 201 Levittown Parkway in Hicksville, NY (Directions on the LIMARC website at: <http://www.limarc.org/fest.htm>) Talk-in on W2VL, 146.85 - repeater 136.5 PL. 9:00a.m.; admission \$6. VE Test promptly at 10a.m. LIMARC VE Liaison, Al Bender W2QZ at w2qz@limarc.org or 516-623-6449. For more hamfest information contact the Hamfest Chairman, Brian Gelber at: W2YMC@hotmail.com, or write LIMARC Hamfest, P.O. Box 392, Levittown, NY 11756-0392.

Cornell won in the graduate category, is sponsored by the National Inventors Hall of Fame and Hewlett-Packard Company.

Pennsylvania State Police Consolidating Dispatch Hubs

Pennsylvania State Police are entering the final stretch of a long-planned switch to a \$130 million dispatch and records management system expected to improve efficiency and response times across the state. The state has been preparing for these changes over the last two years.

The first of five regional dispatch centers will open in Harrisburg this month. Within three years, dispatchers who are now in 81 locations will be working in just five regional centers, barring delays.

Other changes include switching to a new computerized records management system and upgrading the computerized mapping system used to get troopers to incidents more quickly.

Already, computers have been installed in all patrol vehicles to take advantage of a separate project to upgrade the state's emergency radio system. All 1,200 state police patrol vehicles are equipped with computers – called Mobile Dispatch Units – that allow officers to easily send and receive reports and messages.

Longtime MT Staffer Passes

On November 5, 2003, the radio hobby lost one of its top monitors, Robert E. (Bob) Evans. Bob had been a monitor of the shortwave radio spectrum for well over three decades. He was a specialist in aeronautical radio communications, an interest that was kindled at an early stage in his monitoring career. He also specialized in HF/VHF digital communications monitoring.

In 1989, he authored his first book, the *Aeronautical Communications Handbook-HF Edition* which was soon followed by the *Worldwide Aeronautical Communications Frequency Directory* in 1991. Material from his first book was incorporated into the commercial pilot's training program for Eastern Airlines. His last book, *The Worldwide Aeronautical Communications Frequency Directory*, second edition, was published in April of 1994.

As a writer, he contributed to several other radio-related books, including: *Fine Tuning's 92/93 Proceedings*, *The Soviet Maritime Merchant Vessel Directory* and *Understanding ACARS*.

Bob also served as a column writer/editor for both of North America's leading monthly communications publications – *MT's Digital Digest* column (July 1993-December 1998) and the *ACARS Downlink* columnist in *Popular Communications* magazine. He also served as the editor of *The RTTY Listener*, a customer newsletter published by Universal Radio. Bob was a regular speaker at ham and

shortwave radio clubs, *MT* Expos and other major international radio conventions.

A graduate of St. Augustine's College, Ryerson Polytechnical Institute and the University of Toronto, he taught business and computer studies at the college level for 15 years.

He spent the next decade as a computer management information systems consultant in the automotive field. In that capacity he developed and delivered management training programs for a number of North American automotive and computer companies, including General Motors, Ford, Hyundai, Mazda, Porsche and IBM.

He authored a number of computer user and application training manuals for these corporations. Prior to his death, Bob was self-employed as a senior technical writer and corporate trainer through his company R.E. Evans & Associates.

An accomplished nature and studio photographer, his other passions include Egyptology, Astronomy, Computers and the Internet, Classical Music, Stamp Collecting and Wine Tasting and Appreciation. He traveled extensively and conducted educational tours in Egypt and photographic and wildlife safaris in East Africa.



He was a member of the Armed Forces Communications and Electronics Association, the Society for Technical Communication and the Society for the Study of Egyptian Antiquities.

Bob made his home in Don Mills, a suburb of Toronto, Canada, for many years.

-Larry Van Horn

Communications was written by the editors of *Monitoring Times* from news and clippings submitted by our readers. Thanks to this month's reporters: (via snail mail) Anonymous, New York; Ira Paul, Michigan; Doug Robertson, California; Brian Rogers, Michigan; Robert Thomas, Connecticut; (via email) Anonymous, John Figliozzi, Maryanne Kehoe, D Prabakaran, Ken Reitz, Larry Van Horn, Barry Williams, Robert Wyman, Ed Yeary.

MORE BOOM FOR YOUR BUCK!



Antenna Crossarm Boom (Design 1)

With 4-ft. or 2M (78-3/4") lengths, and designed for mast or tower, static or marine mountings, this boom fits the bill! Unique structural platform mounts four magnetic-base mount antennas **OUT AND AWAY from mast or tower**.

Four Foot Steel with four different antennas pictured above. Other uses include a versatile Meteorological sensor platform, surveillance cameras and supports for Photographic and studio lighting. Stacked arrays have multiple Military applications: amphibious operation voice and code communications plus RDF.

1. Four Foot Steel/Gold Zinc (small 4" pads) 9.4# \$129.00
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3. Four Foot Aluminum/Grey (large thin 5" pads) 4.7# \$199.00
4. Two Meter Al (78-3/4") Grey (large thin 5" pads) 7.5# \$349.00
5. Two Meter Al (78-3/4") Grey (large thick 5" pads) 9.8# \$369.00
6. Two Meter Stainless Steel (small thick 4" pads) 20.3# \$599.00

The advantage of flush pads is they can accommodate larger base amounts without blocking ground plane mounting holes. Flush bases are more desirable when two extra pounds are not critical. 12- and 24-foot designs available direct from factory. Special Stainless or Rubber coated U-bolts available at additional charge.

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Monitoring the South American Military

By Ron Peron

Our geographic neighbors to the South, in Latin and South America, are not that far away and offer some interesting monitoring. Most of the nets that I'm going to tell you about are relatively easy catches for listeners in the US and Europe. I live in Maryland and for the last several months I've been listening to the military HF ALE nets of several of these countries. Before I jump into the details of what I've been hearing, I think a little background would be useful.

I've been listening to HF utility stations for about six years and was not into the digital signals world. I concentrated my listening on SSB voice nets and had catalogued many Spanish language nets. My Spanish, however, is very weak (a generous self-assessment) and my ability to find out to whom I was listening was quite limited.

That all changed in May of this year when I "leaped" into the digital world. I had been reading the posts on the Worldwide Utility Newsletter (WUN) list and began to get curious about what these "ALE" nets were all about. I did a little research and decided to give it a try. I installed Charles Brain's wonderful little PC-ALE program. It only needs a modestly powerful PC, a sound card, and a couple of inexpensive cables and you can be up and running with the digital "dogs."

Once I had the program installed and learned how to run it (a very easy learning curve, I might add), I was surprised at the wealth of information that was available on nets in the HF ALE world. Using information I found in Hugh Stegman's *Utility World* and Mike Chace-Ortiz's *Digital Digest* columns and Mike's Utility Monitoring Central web site (<http://www.chace-ortiz.org/umc>), as well as posts on the WUN list (See Resources), I started searching around to see what I could hear. I was soon regularly monitoring nets in Mexico, Colombia, Venezuela, Brazil and Ecuador.

My HF "shack" consists of a well-worn Sangean ATS-909 and a fairly new Icom R-75. For antennas I'm using a PAR Electronics EZ-SWL and a home-brew 130-ft dipole, both of which are up in my attic. For various reasons, such as overhead power and cable lines, trees and a small suburban lot, outside antennas are not an option. My equipment is rather modest, but I hope you'll see that it doesn't take much

to be monitoring some interesting nets from wherever you're located.

The South American Scene

Enough "background"; let's get down to what makes the South American countries interesting listening. First of all, several of them cooperate with the U.S. in the war against drugs – sometimes on a covert basis. Several of these countries have internal problems of their own which also provide interesting listening. Mexico, for example, in addition to fighting the drug traffickers is periodically faced with internal strife from the native Indian populations which requires the intervention of their military forces.

Venezuela, like Mexico, is fighting the drug war while at the same time its President, Hugo Chavez, strives to maintain his power. Over the last couple of years there have been several strikes and incidents of civil unrest requiring intervention by the military. Venezuela is a major producer of crude oil and a member of the Organization of Petroleum Exporting Countries (OPEC), making its stability one of our country's national interests.

We're all familiar to some degree with the situation in Colombia. The government there is fighting a two-front war, one against the drug cartels and their powerful influence and the other against several rebel paramilitary organizations trying to bring down the elected government. Both these "wars" are being waged with overt and covert help from the U.S. The fairly large American military and civilian presence in Colombia makes a very inviting target for attacks, kidnappings and harassment by these paramilitary groups. Kidnapping foreigners, especially Americans, and holding them for ransom has become one of the major fund raisers for these paramilitary groups.

Let's take a look at some of these countries and their military/paramilitary HF ALE nets that I've been able to monitor. A word of caution here. These frequencies and ALE identifiers were in use as of the writing of this article in late November 2003. They may have changed since then. The same applies to the web sites and URLs that I mention in the article.



MEXICO

Army:

The Mexican Army has divided the country into 12 Military Regions (Region Militar) and these are seen as RM ## in ALE. These Military Regions are further subdivided into 44 Military Zones (Zona Militar). I have not yet seen a reference to Military Zones in HF ALE communications. So far I've only seen the Mexican Army using HF ALE. However, I would suspect that their Air Force and Navy also use it as well.

My monitoring indicates that there are various categories or groupings of ALE identifiers used on Mexican Army nets. The different categories may represent different echelons of command or perhaps units in various geographic regions of Mexico. Sometimes, after the ALE "handshake," the communicants will use an encrypted voice system



I am indebted to Hugh Stegman who has provided several of the frequencies and ALE identifiers used by the Mexican Army. He listens from California and can usually hear the Mexican military nets better than I can from Maryland.

Planets

Freqs: (USB)

06955.0
09025.0
09060.0
0135.0

Identifiers:

Venus
Marte (Mars)
Urano (Uranus)

Tierra (Earth)
Universo (Universe)
Mercurio (Mercury)

Minerals/Jewels

Freqs: (USB)

04650.0
07777.0
08047.0
08084.0
09060.0
10135.0
10444.0

Identifiers:

Aluminio
Acero (chrome steel)
Cobre (copper)
Diamante (Diamond)
Jade
Zeta (?)

Countries

Freqs: (USB)
09060.0

Identifiers:

Espana
Israel

Animals

Freqs: (USB)

05252.0
05263.0
08050.0
09060.0
10135.0
10444.0

Identifiers:

Tigre
Pantera (Panther)
Lobito (small wolf?)
Puma
Leon (Lion)
Jaguar
Chacal (Jackal)
Cardenal (Cardinal)



Meteorlogical

Freqs:

07777.0
09025.0

Identifiers:

Huracan (Hurricane)
Ciclon (Cyclone)
Rayo (Lightning bolt)
Centella (Lightning)

Miscellaneous

Freqs: (USB)

07777.0
08050.0
09060.0
10444.0

Identifiers:

123- possibly Army HQs
Ganzo (?—possible garble)
Espirito (??)
Coca (Cocao)
Torre (tower)
Alfil (Bishop)
RM ## (Region Militar-Military Region)- 5, 7, 13, 15, 17.

COLOMBIA

Navy:

Freqs:

5406 USB
5493 LSB
6809 USB
10608 USB
11155 USB
13530 LSB



Identifiers:

Radjena- Unidentified control ashore
FSUCA- Submarine Force (Fuerza Submarino), Cartegena
Pijao- SS# 28 "Pijao"
Malpelo- BO-156, Auxiliary vessel
CESYP= Comando Especial San Andreas Y Providencia
CARIBE= San Andreas Caribbean Command
Caldas3= (Corvette "Caldas", CM-52)



Army:

I've also monitored what I call a Colombia telephone network. I think it's being operated by the military and serves both military personnel and local inhabitants living and stationed in the rural areas. It appears that this network provides opportunities for telephone calls from these rural area into the major population centers

Freqs: (All LSB)

10937.0 (poss—only voice noted)
11430
13500
14000
16430
16529

Identifiers:

MOM- Unidentified location
Mochuelo- placename
Sejeri- possible placename
PRF 320 (possibly Border Radio Post—Puesta Radio Frontera)
PRF 321
1501- Unidentified location
1901- Unidentified location.

There's another net I call the "Sitio" net. All the subscribers on this net use Sitio ##E as their ALE identifiers. SITIO is Spanish for "site" or "location" and I believe the E suffix equates to Ejercito (Army). I believe that these "Sitio" subscribers are Colombian military combat support units (intelligence, logistics, medical) stationed around the country supporting the government's war on drugs.

I ran across a web site in Spanish. The web site is entitled Radiografia del Ejercito de Colombia. According to this web site, the Colombian Army has a battalion-level series of Combat Support Units (Apoyo de Servicios Para el Combate - ASPC). The mission of these units is to provide support to combat units in the field to assist them in carrying out their missions.

The ASPCs provide supply, transport, health and other services which permit the combat units to maintain their tactical capabilities. The Order of Battle for these ASPC units closely parallels the Sitio ##E identifiers I've seen.

Freqs: (USB)

6955
8560
10326
11018
13530

VENEZUELA

Air Defense Command:

As you would expect, this net serves various air defense missile sites and surveillance radar units based at/near Venezuelan Air Force bases and other strategic locations such as hydroelectric dams. The Headquarters of the Venezuelan Air Defense Command (CDDA) is at El Liberator Airbase, just outside of Caracas.

Freqs: (USB)

05695.0
07810.0
09065.0
11130.0
13475.0



Identifiers:

CDDA- Air Defense Command Center (Centro de Defensa Aerea)- El Liberator Airbase
GURI- Air Defense site at Guri Dam
MENE or Menemaoa- Air Defense site
MAR or Maracay- Air Defense site
PTOORDAZ or PTO- Puerto Ordaz Air Defense site
GUA or Guasdualito- Air Defense site
MARGARITA- Isla Margarita Air Defense site
MONTECANO- Air Defense site
PTOFIJO or Puerto Fijo- Air Defense site

Navy:

Along their Atlantic/Caribbean coastline, the Navy has two zones of responsibility: the Western Zone (Zona Occidentale-HQs Punto Fijo) and the Eastern Zone (Zona Oriente-HQs Carupano).

Like several other countries in the area, their geography dictates that the Navy also has a riverine component operating in the Central Zone (Zona Centro-HQs Puerto Cabello) and an Southern Zone (Zona del Sur-HQs Caicara del Orinoco). The riverine forces use small craft to patrol the country's many rivers, including the large Orinoco River which winds through the jungle areas bordering Colombia, Brazil and Guyana.

Freqs: (LSB)

08260.0
08280.0
08285.0
09350.0
10650.0
12546.0
14790.0
20400.0

Identifiers:

ARMARIO- Naval base at Puerto Cabella (named after Agustin Armario de Puerto Cabella)
 BNARCO, Commando, Basa Navale Amario
 BDIRCO- Batallon de Ingenieros de Combata (Combat Engineer Battalion)
 CANCO- unk
 COFFRI1- Commander of Riverine Forces
 DCCOP-Direccion de Coordination Y Control Operacional
 DIVIMCO1- unk
 MASCARA- unk
 MACABRO- unk
 BRION- Frigate "Almirante Brion", F-22
 FEDERACION- Patrol Craft "Federacion", PC-12
 LIBERTAD- Patrol Craft "Libertad", PC-14
 PUNTA BRAVA- Auxiliary vessel "Punta Brava", BO-11
 CAPANA- Capana-class Medium Landing Ship "Capana", T-61
 ALBATROZ- Patrol Boat "Albatroz", PG-31
 PELICANO- Patrol Boat "Pelican", PG-34
 F-21- Frigate Mariscal Sucre
 F-22- Frigate Almirante Brion
 F-26- Frigate Almirante Garcia
 T-63- Medium Landing Craft (LSM) Goijaira
 T-64- Medium Landing Craft (LSM) Los Llanos

Army:

1st Infantry Division
 08260.0
 11625.0
 2nd Infantry Division
 05760.0
 07597.0
 08187.0
 09232.0
 10156.0
 11610.0
 3rd Infantry Division:
 07597.0
 08050.0
 09232.0
 09259.0
 10150.0
 12192.0
 13464.0
 13506.0
 4th Infantry Division:
 12185.0
 13455.0
 5th Infantry Division:
 05406.0
 06786.0
 07399.0
 09233.0
 09906.0
 10115.0
 12191.0



14569.0

Units noted:

CUFAN- Unified Armed Forces Command
 Regional Command Centers (CRC) of Regions 1, 3, 4, 5, & 7
 13th Inf Bde
 102nd Motorized Inf Group
 131st Motorized Inf Bn
 22nd Inf Bde
 23rd Special Operations & Security Bde
 222nd Motorized Inf Bn
 224th Motorized Inf Bn
 2MA6- Special Operations Unit
 2MA8- Special Ops unit
 31st Inf Bde
 311th Motorized Inf Bn
 32nd Inf Bde
 340th Tactical Comms Bn
 341st Tactical Comms Bn
 347th Tactical Comms Bn
 348th Tactical Comms Bn
 349th Tactical Comms Bn
 41st Armored Bde
 42nd Armored Bde
 43rd Armored Bde
 431st Motorized Cavalry Group
 432nd Motorized Cavalry Group
 433rd Motorized Cavalry Group
 442nd Armored Battalion
 4MA0 (Special Operations Unit)
 501st Hqs Bn
 51st Jungle Inf Bde
 512th, 513th & 514th Jungle Inf Bns
 5MA0 Special Ops Unit

to in the SCLC/SCLM identifiers. It is used by battalion-level units when communicating with higher echelons, i.e. brigades and above. I believe it has to equate to something like "sub", "subordinate" or "secondary", but I could find no logical Spanish language equivalent.



BRAZIL

Brazil is the largest country in South America. As such, the Brazilian military uses an extensive HF network. The Brazilian Navy is "blue water" navy and it also maintains a large HF ALE network.

Navy

Freqs: (USB)
 08031.0
 08310.0
 09117.0
 09306.0
 11010.0
 11452.0
 11455.0
 11486.0
 11530.0
 12132.0
 12370.0
 12437.0
 13101.0
 13224.0
 14705.0
 14780.0
 15932.0
 16355.0 (SAR)
 19709.0

Identifiers:

ERMBEL - Brazilian Navy Radio Station, Belem
 ERMNAT - Brazilian Navy Radio Station, Natal
 ERMRO - Brazilian Navy Radio Station, Rio de Janeiro
 FCONST - Brazilian Navy Frigate F-42 CONSTITUIÇÃO (Classe NITEROI)
 FDEFEN - Brazilian Navy Frigate F-41, Defensora, Niteroi-class
 FUNIAO - Brazilian Navy Frigate F-45 UNIÃO (Classe NITERÓI)
 NDDCEA - Brazilian Navy G-30 CEARÁ (Navios de Desembarque-Doca)
 NEBRSIL - Brazilian Navy U-27 BRASIL (Navio-Escola)
 SARBR - Brazilian Search & Rescue.
 CVINHA - Corvetas V-30 INHAUMA (Classe INHAÚMA)
 FBOSIS - Frigate "Bosisio", F-48
 PE1- possibly Sao Pedro de Aldeia (Naval Air Base)
 CE1- probably Ceara (Naval Port)
 BR1- probably Brasilia (VII Naval District)
 MS1- probably Manaus (Commando Naval do Amazonas Occidental)
 RS1- unidentified
 SMA- unidentified
 RE1MO - Base Naval do Recife (Estado



Note: I'm not exactly sure what the "S" equates

Pernambuco)
BA1SE - Base Naval do Bahia, Aracaju (Estado
Sergipe)

ECUADOR

During the summer of 2003, units from the navies of US, Ecuador, Chile, Peru and Colombia took part in the Pacific Phase of UNITAS-03. I was able to monitor the following participants.

Freq:
07900.0 USB

Identifiers:
COOPNA - Naval Operations Command
(Comando Operaciones Naval)
CFF - Commander Frigate Force (Comando
Fuerza Fragata)
CORMAN - Corbeta Manabi (CM 12)
CORGAL - Corbeta Los Galapagos (CM 15)
CORORO - Corbeta El Oro (CM-14)
CORESM - Corbeta Esmeraldas (CM 11)
LAMCUE - Lancha Missileria Cuenca (LM 24)
HALCON - Type B 119 class PG "Halcon"

RESOURCES

Mexico: (<http://www.sedena.gob.mx/ejto/index.html>)
Colombia: Navy (<http://www.armada.mil.co>);
Colombia: Army (<http://www.ejercito.mil.co>)
Venezuela: Air Defense (<http://www.fav-club.com/comdef.htm>); Navy (<http://www.fav-club.com/armada.htm>); and Army
(<http://www.fav-club.com/ordendebatalla.htm>).
Brazil : (<http://www.mar.mil.br>).
Ecuador: (<http://www.fuerzaarmadaecuador.org/naval>).

Even though my Spanish is very weak I find it useful to look at the web pages of the Ministries of Defense of the various countries. They are usually a good starting place and can normally be found by using search terms such as "armada" (navy), "ejercito" (army) " fuerza aera" (air force), along with the country's name. Just looking at these web sites will give you plenty of organizations, order of battle, unit names, and, many times, key abbreviations/acronyms used by these entities. Some of these web pages are also available in English.

Another great source, especially for naval units is <http://www.hazegray.org/worldnav>. This site has very accurate and up-to-date information on most of the world's navies. If you can get access to the famous Jane's *All the World* series they can provide you with accurate information on the world's military and even some good pictures.

Of course, there's the WUN list (<http://mailman.qth.net/mailman/listinfo/wun>), where there are current postings of many military nets. The WUN is also a good source of information. Just ask a question to the list and there's a very good chance that someone will have the answer or they can point you to a good resource in which to find your answer. The WUN web page at <http://www.wunclub.com> is also where you can find good information on ALE and download a copy of Charles Brain's PC-ALE program.

In this article I've talked exclusively about the South American military ALE nets that I have listened to. In addition, there are many

Spanish-language voice (USB & LSB) nets that I have catalogued. Unfortunately my Spanish isn't good enough for me to have identified many of these nets, but I can tell by the use of callsigns and the communications procedures that they are military or paramilitary nets. I also believe that some of these Spanish voice nets belong to the narco-traffickers.

If I've sparked your interest in listening to these South American military nets I'd be glad to exchange information on what you've heard, especially on any Spanish language voice nets. I'd also be glad to answer any questions you may have on the nets that I have mentioned here. You can reach me at rapbep@aol.com.

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Domestic Shortwave Broadcasting in Russia

By Bernd Trutenuau

The 1990s brought a boom for domestic broadcasting on shortwave in Russia. Apart from the national program Radio Rossii, many regional programs appeared on SW, often transmitted via low power local transmitters.

This has its background in the network of jamming transmitters that had been built in the USSR since the 1950s. Every provincial capital had local groundwave jammers installed. A typical transmitter type was a 5 kW "Vyaz" model, designed for utility purposes. When the USSR stopped jamming of foreign broadcasts in 1988, these transmitters suddenly became vacant and in many places it was decided to use them for regular local programming.

Since these former jamming transmitters are of low power, the Russian telecom authorities over the years have tried to protect the coverage area by registering them internationally (e.g. High Frequency Co-ordination Conference, HFCC) with a higher power or for different locations. This has led to some confusion among DXers, if using reference lists like the HFCC operational schedule, since the details shown in these lists do not always match with reality.

The 1990s also were difficult years for the transmitter operators in Russia. The mixture of old and new structures, often working in parallel, caused frequent disturbances in the operation, including numerous electricity cut-offs because of unpaid bills, especially in the Russian Far East.

New Regional Network

In 2000, a new national transmitter network operator was established – Russian Television and Radio Broadcasting Network (RTRN) which now owns most of the transmitters in Russia under a united roof and leases them (via its regional branches) to the national, regional and local broadcasters, both state-run and private. RTRN has a modern management and is striving for an efficient operation of its transmitter park.

Russia is a federal state (the full name is "Russian Federation"), consisting of 89 entities: 49 oblasts, 21 republics, 10 autonomous okrugs, six krays, two federal cities and one autonomous oblast. Each of the 89 entities has at least one regional state broadcaster. These regional state radio stations are financed in part by the federal budget; the other parts originate from the regional government and from income through advertising. This means that a station's budget can vary a lot. Some stations can afford to produce many hours of regional programming and rent many transmitters; others produce only a small output.

Regional broadcasters typically rent transmitters that are also used by one of the national networks, in most cases by Radio Rossii. In general, regional stations are relaying the Radio Rossii news on top of the hour even during the regional programming.

With the exception of NVK "Sakha" in the Republic of Sakha (Yakutia), no broadcaster owns its transmitters: all of them have to be leased from RTRN. Partly as an attempt to reduce operational costs, many regional broadcasters have meanwhile abandoned SW and even MW and are fully concentrating on FM distribution. This is especially the trend since RTRN started to transform the huge wired radio net-

work and to replace it by small FM translators which usually are rebroadcasting Radio Rossii and the output of the regional state radio broadcaster. Polls have shown that the older generation of listeners still prefers to listen to MW, while the number of SW listeners has fallen considerably over the last years.

But there are still areas in Russia that can be reached effectively only by shortwave: especially the huge and scarcely populated territories in Central and Northern Siberia and the Russian Far East. Another important audience is the Russian merchant and fishery fleet. That is why many SW transmitters along the Russian coasts continue to operate as usual.

Return to State Programming

The main customer for domestic SW has so far been the national state-run program Radio Rossii (RR). RR was renting a large number of transmitters that were distributing its programs on SW to all parts of Russia around the clock.

Even though the traditional winter frequencies were registered in advance at the last HFCC conference, most of these relays were switched off in November 2003 at the beginning of the B03 season. Affected was primarily the use of transmitters at the large transmitting centers that also carry SW transmissions for abroad – like Moscow, St. Petersburg, Krasnodar (Tbilisskaya), Samara, etc. Some few frequencies have been reactivated since then, and not all may be shown in the table below.

These days, SW in Russia is used almost exclusively by state-run programs. It was a different situation in the beginning of the 1990s, when independent broadcasters mushroomed on SW, thanks to low transmission rates and the widespread practice of "arranging" such trans-



missions through personal contacts or "special relationships."

Russia had just started to experience market economy and the society was overrun by waves of changes. All of these stations disappeared from the air after a while. Some religious broadcasters continued until 2002, but now only one station is left: Radio Studio in St. Petersburg. Radio Studio is actually a station run by the regional administration and thus not a "true" independent station. It is on the air in St. Petersburg on FM around the clock, and had received a license to also use SW. The costs for the 200 kW SW transmitter are considerable, and Radio Studio is limiting its output to a week of daily transmissions per quarter – the minimum amount that is required in order to retain the license.

A) Ordinary regional services (state-run)

A1) GTRK "Pomorye"

Address: ul. Popova 2, 163061 Arkhangelsk.

Email: pomorie@atnet.ru

Regional programs: W 0400-0500, 1500-1600 (Sat 1510); Sun 0500-0600.

A2) Permskaya GTRK "T-7"

Address: ul. Tekhnicheskaya 7, 614070 Perm.

Email: main@t7.ru

Regional programs: MF 0210-0300, 0310-0400, 1310-1400; Wed 1610-1700; Sat 0210-0300, 0810-0900; Sun 0410-0500.

Operational SW schedule for the B03 season (winter 2003-2004)

No	kHz	kW	Schedule	Site	Program
A9	4040	5	2200-1800	Tura, S	R. Rossii + Reg GTRK "Khuglen"
A8	4520	2.5	1800-1400	Palana, FE	R. Rossii + Reg GTRK "Palana"
A3	4795	50	2200-1800	Selenga, S	R. Rossii + Reg Buryatskaya GTRK
A5	4825	5	2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
RR	5895	250	1830-2200	Moscow, ER	R. Rossii
RR	5925	250	0200-0500	Moscow, ER	R. Rossii
RR	5930	50	0200-2200	Monchegorsk, E	R. Rossii
RR	5940	100	1900-1500	Arman, FE	R. Rossii
B3/4	6005	100	1800-1900	Tbilisskaya, E	R. Maykop/R. Nalchik
A2	*6030	5	2300-1400	Perm, E	R. Rossii + Reg GTRK "T-7"
A10	6060	5	2000-1600	Blagoveshchensk, FE	R. Rossii + Reg GTRK "Amur"
RR	6075	100	1900-1500	Arman, FE	R. Rossii
A4	6085	50	2200-1800	Krasnoyarsk, S	R. Rossii + Reg GTRK "Tsentr Rossi"
A6	6100	15	2200-1800	Kyzyl, S	R. Mayak + Reg GTRK "Tyva"
A5	6150		2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A2	**6150	5	2300-1400	Perm, E	R. Rossii + Reg GTRK "T-7"
A1	6160	40	0200-2200	Arkhangelsk, E	R. Rossii + Reg GTRK "Pomorye"
C1	6235	200	1800-2100	Krasnyy Bor, E	R. Studio
A5	7140	5	2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A5	7200	100	2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
RR	7310	250	1530-1800	Moscow, ER	R. Rossii
RR	7320	100	1900-1500	Arman, FE	R. Rossii
A5	7345	5	2000-1600	Yakutsk, FE	R. Rossii + Reg NVK "Sakha"
A2	11650	5	1405-1800	Perm, E	R. Rossii + Reg GTRK "T-7"
A7	#11840	20	1800-1400	Yuzhnyy-Sakhalinsk, FE	R. Rossii + Reg GTRK "Sakhalin"
B1	11915	200	0900-1000	Samara, E	Tatarstan dulkynynda
B2	11975	200	0000-0100	Yelizovo, FE	Kamchatka rybatskaya
RR	12075	250	0530-0800	Moscow, ER	R. Rossii
B1	15105	200	0500-0600	0700-0800	Samara, E Tatarstan dulkynynda
RR	17600	250	0830-1500	Moscow, E	R. Rossii

E) European part of Russia; S) Siberia; FE) Russian Far East

*) Summer months; **) Winter months; #) USB

RR) Radio Rossii relay (without regional programming)

GTRK = *gosudarstvennaya teleradiokompaniya* ("state broadcasting company"); NVK = *natsionalnaya veshchatel'naya kompaniya* ("national broadcasting company")

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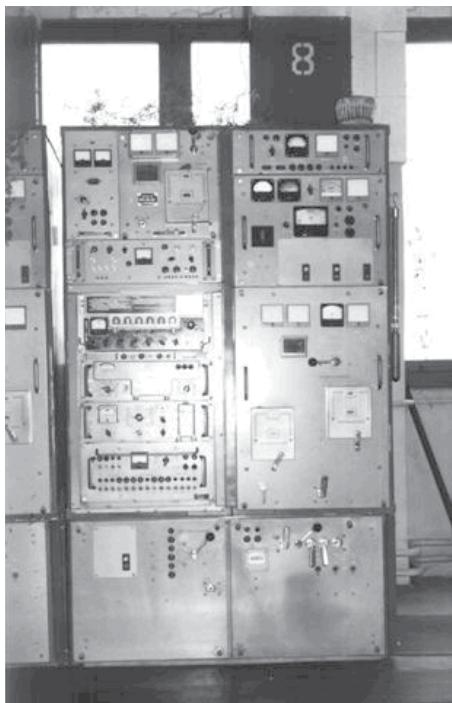
A3) Buryatskaya GTRK
Address: ul. Erbanova 7, 670000 Ulan-Ude.
Email: office@bgtrk.ru
Regional programs: 2200-0500, 1100-1200.

Notes: Programs in Buryat and Russian.

A4) GTRK "Tsentr Rossii"
Address: ul. Mechnikova 44a, 660028 Krasnoyarsk.
Email: new@public.krasnet.ru
Regional programs: MF 2310-0100, 1110-1300; Sat/Sun 0000-0400.

A5) NVK "Sakha"
Address: ul. Ordzhonikidze 48, 677007 Yakutsk.
Email: radiotv@nbcsakha.ru
Regional programs: 0310-0500 (Tue-Thu), 0410-0500 (Fri), 0910-1300 (Mon-Fri), 2120-2400 (Sun-Thu), 2210-0455 (Fri/Sat).

Notes: programs in Yakutian and Russian. Each frequency has a different beam, some frequencies may not be in operation.



A "Vyaz 2M-OP," a typical transmitter that was used in the USSR for local jamming until 1988. Power in AM mode – 2.5 kW, in CW, SSB and FM modes – 4-5 kW. Power consumption - 18 kW, frequency range - 3-24 MHz. In use for regular regional programming e.g. in Perm, Palana and other locations. Photo: Rimantas Pleikys

A6) GTRK "Tyva"
Address: ul. Gornaya 31, 667003 Kyzyl.
Email: tv@tuva.ru
Regional programs: 2310-2400, 0010-0100, 1110-1200, 1210-1300.
Notes: programs in Tuvinian and Russian. Observed relaying both Radio Mayak and Radio Rossiya.

Национальная
Вещательная
Компания



"С А Х А"

A7) GTRK "Sakhalin"
Address: ul. Komsomolskaya 209, 693000 Yuzhno-Sakhalinsk.
Email: romanov@gtrk.sakhalin.su
Regional programs: 2000-2100, 0210-0300, 0800-0815, 1120-1210.
Notes: on SW for ships in the Pacific Ocean.

A8) Koryakskaya GTRK "Palana"
Address: Obukhova 4, 684620 Palana.
Email: n/a
Regional programs: D 2000-2030, Tue-Thu 2145-2200, Tue-Wed 0115-0145, Sat 0700-0800.
Notes: programs in Koryak and Russian. May have left SW.

A9) Evenkiyskaya GTRK "Kheglens"
Address: ul. 50 let Oktyabrya 28, 663370 Tura.
Email: n/a
Regional programs: D 0100-0200, 0500-0515.
Notes: programs in Evenki and Russian. May have left SW.

A10) GTRK "Amur"
Address: per. Svyatitelya Innokentiya 15, 675000 Blagoveshchensk.
Email: vesty@tsl.ru
Regional programs: MF 2000-0000, 0300-0400, 0900-1000; Sat 2200-2300; Sun 0010-0100..
Notes: may have left SW.

B) Special regional programming (state-run)

B1) Tatarstan dulkynnda ("On the air waves of Tatarstan")
Produced by: TRK "Novyy vek"
Address: ul. Sh. Usmanova 9, 420095 Kazan.
Email: tnvpr@telebit.ru
Schedule: 0500-0600 towards Russian Far East & 0700-0800 towards Urals and West Siberia on 15105, 0900-1000 towards West Russia on 11915kHz.
Notes: A service in Tatar and Russian for the over 2.5 million ethnic Tatars living outside of Tatarstan in other parts of the Russian Federation.

B2) Kamchatka rybatskaya ("Kamchatka for fishermen")
Produced by: GTRK "Kamchatka"
Address: ul. Sovetskaya 62, 683000 Petropavlovsk-Kamchatskiy.
Email: gtrkotk@mail.iks.ru
Schedule: 0000-0100 in Russian on 11975kHz.
Notes: A service for Russian fishermen in the Pacific Ocean.

B3) Radio Maykop
Produced by: GTRK "Adygeya"
Address: ul. Zhukovskogo 24, 352700 Maykop.
Email: trkra@maykop.ru
Schedule: 1800-1830 in Adyghian on 6005kHz.
Notes: A service for Adygean expatriots living in the Near East. May include sequences in languages of the target area, like Arabic and Turkish.

B4) Radio Nalchik
Produced by: GTRK "Kabbalkteleradio"
Address: pr. Lenina 3, 360000 Nalchik.
Email: tvkbr@mail.ru
Schedule: 1830-1900 in Kabardino-Circassian and Balkar on 6005kHz.
Notes: A service for Circassian expatriots living in the Near East. May include sequences in languages of the target area, like Arabic and Turkish.

C) Other broadcasters

C1) Radio Studio
Address: Ligovsky prospekt 174, 192007 St. Peterburg.
Email: studiosw@metroclub.ru
Notes: on the air every three months for several days in the evening hours. Next transmissions planned for March 2004.



HF frequencies are supposed to be coordinated with other broadcasters to avoid interference, but real life broadcasting sometimes tells a different tale. Sometimes the clashes are only resolved when world politics undergo a radical change. Here are two such instances, one in the past and one in present day.

Tales of Two Frequency Clashes

By Rimantas Pleikys and Sigitas Zilionis

U.S. versus Soviet Union

In 1950 under the Copenhagen frequency plan, Moscow was granted the long wave frequency of 173 kHz. However, during the Cold War, the American radio station in Erching near Munich in West Germany persisted in operating on the same frequency. It was on air from September of 1953 until February of 1963 and from September of 1968 until November of 1973.

The American station used a 1000 kW Continental 105B type transmitter and a 279 meter omnidirectional single mast antenna. Power was supplied from five diesel-generators, which consumed as much as 560 liters of fuel per hour.

In 1963-1968 and in 1973-1979 the station was off the air, because the USSR temporarily stopped jamming of the Voice of America, British Broadcasting Corporation and Deutsche Welle. In 1968 the station resumed transmission during the Czechoslovakia crisis. It closed down in 1973 with the Helsinki process beginning a new phase of East-West relations.

The Erching radio station transmitted the programs of VOA in Russian, Czech, Slovak, Hungarian, Polish, German and English languages, as well as the program of RIAS (Radio in the American Sector) in German. The broad-

casts of VOA in Russian on 173 kHz were intended for the Soviet soldiers in East Germany and Czechoslovakia, but they were occasionally audible in the western part of the USSR as well. Moscow, Prague and East Berlin jammed the 173 kHz channel whenever RIAS and VOA broadcast in German, Czech and Slovak languages.

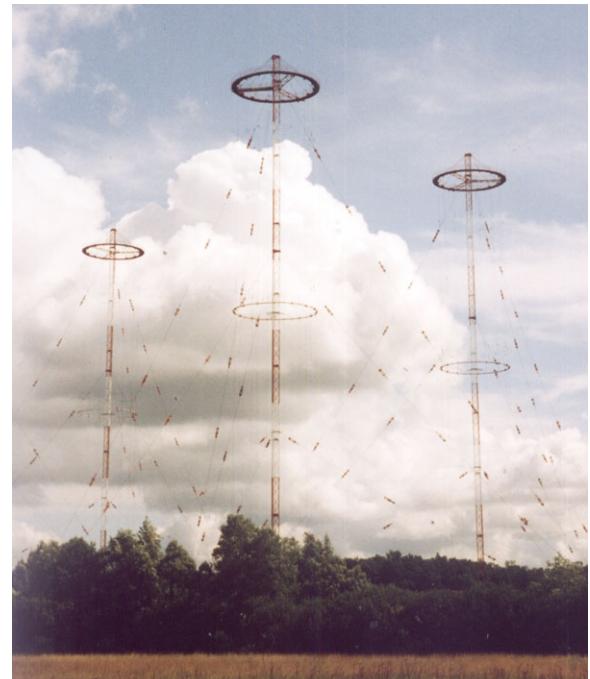
In 1979, the the Erching station officially started broadcasting of Deutschlandfunk on 207 kHz with the half power of 500 kW. The station went off the air forever in June of 1986 and was dismantled in 1990.

Russia versus Lithuania

In March of 2002 a Lithuania-based private broadcaster Radio Baltic Waves International was awarded a license to broadcast on 1386 kHz AM, using a 1000 kW transmitter (EIRP = 32.1 dBkW, or 1622 kW) with a nondirectional antenna. However, a high-power station at Bolshakovo in the Russian exclave of Kaliningrad, sandwiched between Lithuania and Poland, uses the same frequency to bring the programs of Voice of Russia to West Europe.

In the Montreaux (1939), Copenhagen (1948) and Geneva (1978) frequency allocation plans of the International Telecommunications Union (ITU), the "219 meter" and, later, a 1386 kHz medium wave channel was assigned to "Kaunas, Lithuania." In 1951, the Sitkunai radio station near Kaunas started operation on the assigned channel.

In 1974, Russians built a 2500 kW transmitter with an 8-mast SV4+4 type antenna

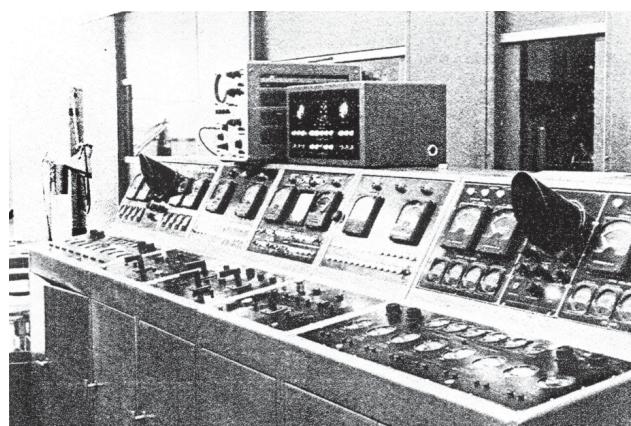


Russian 8-mast antenna at the Bolshakovo radio center. Beam 275°, gain 12 dB. Photo courtesy of Bernd Trutenu

near Kaliningrad and put it on the AM frequency of 1386 kHz. The new station was located 140 km away from Kaunas, where it was intended to be. According to the ITU rules, a move of a station more than 20 miles away from its registered location cannot be done without a new international coordination.

In 1991, when Lithuania separated from the USSR, the Lithuanian and Russian telecommunication ministries signed a protocol on separation of functions and responsibilities. With this protocol, Russia declared recognition of frequency assignments to Lithuania. However, Russian broadcasts on 1386 continued to interfere with Radio Baltic Waves.

Finally, in September of 2003, the telecommunications administrations of Lithuania and Russia agreed upon a schedule of gradual reduction of operation by the Russian Bolshakovo station on 1386 kHz until the final cessation on November 1, 2007.



Master control console of the Erching radio station. (Source: "Funkschau," 1979)



Scanning Salt Lake Center ARTCC

By Jon Van Allen KF7YN



Salt Lake Center ARTCC (Air Route Traffic Control Center) controls a large area of the Intermountain West including all of Utah, all of southern Idaho, a good portion of Nevada, southwest Montana and western Wyoming and also a portion of southeast Oregon. This represents an area of about 200,000 square miles!

It is interesting as a scanning enthusiast to understand how an ARTCC controls such a large area of responsibility. The Federal Aviation Administration (FAA) operates several remote controlled radar domes in such places as Sawtelle Peak in the Island Park Idaho area near West Yellowstone Montana, some 300 miles north of Salt Lake City.

Air traffic controllers at Salt Lake Center watch aircraft and communicate with them over this vast area by remote radar and radio sites, all linked by remote control. Of course local airports usually have their own communications, but chances are the aircraft are in contact with Salt Lake Center ARTCC at some point along their flight paths.

Good Listening

One advantage of airband scanning is that it is not limited to close proximity to airports. I always bring my scanner even while I'm camping, fishing or on the road, and I am almost always rewarded with airband scanning action. I can't recall how many times I discovered the purpose of the airplane or helicopter that just flew over in some unexpected area by scanning these airband frequencies.

Keep in mind that UHF mil-air frequencies are in a state of change across the entire US, so the UHF listings are not 100% accurate. I have corrected these frequencies where known. You may be surprised at the amount of UHF traffic to be heard in the Salt Lake ARTCC, but consider the number of military facilities located in northern Utah: Hill Air Force Base, Dugway Proving Grounds/Michael AAF, Eagle Range, Utah Test Range and Utah Air National Guard, plus Mountain Home AFB in Idaho.

You can get a feel for the enormous air space controlled by Salt Lake Center by the states represented in Table One. In addition to

enroute traffic control for civil and military air traffic, Salt Lake Center also provides air traffic control services for approach to Billings, Boise, Great Falls, Helena, Spokane (Missoula), Mountain Home, Salt Lake City, and Twin Falls Approach; and for departure (tower) to Billings, Boise, Bozeman, Elko, Glacier (Kalispell),

Great Falls, Hailey (Sun Valley), Helena, Hill, Idaho Falls, Jackson, Missoula, Mountain Home, Ogden, Pocatello, Salt Lake City, and Twin Falls.

If you're headed out west, chances are, you're going through ZLC-controlled airspace!

Table 1

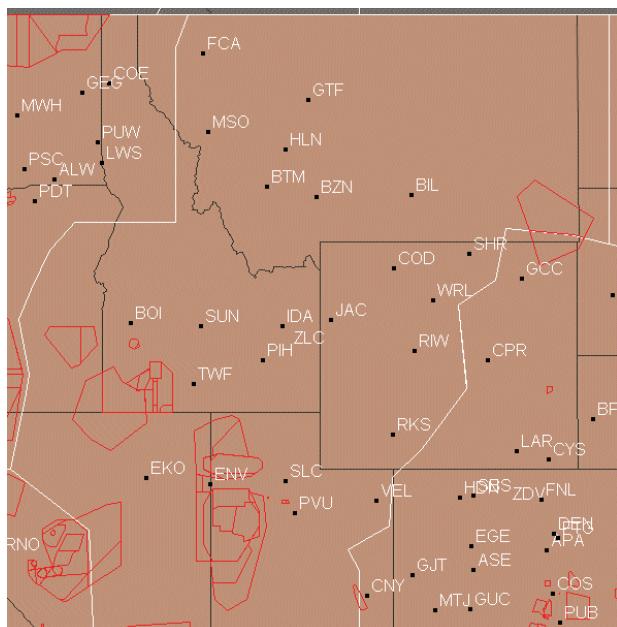
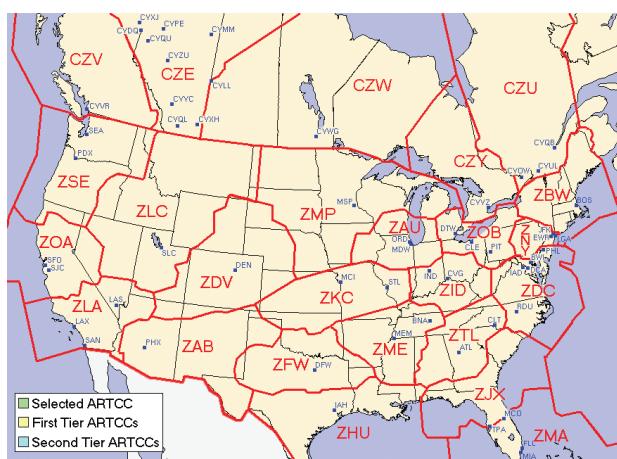
Salt Lake ARTCC (KZLC)							
CITY	ST	VHF 1	VHF 2	VHF 3	UHF 1	UHF 2	UHF 3
Ashton	ID	128.350	132.400	338.300	381.600		
Baker	OR	128.050	387.150				
Battle Mtn	NV	128.725	132.250	269.000	352.000	363.150	
Big Piney	WY	128.350	381.600				
Billings	MT	127.750	351.900				
Blackfoot	ID	128.350	381.600				
Bliss	ID	118.050	128.550-	363.000	397.900		
Boise	ID	118.050	269.050				
Bozeman	MT	132.400	338.300				
Bryce Canyon	UT	133.600	269.250				
Burley	ID	118.050	363.000				
Butte	MT	132.400	133.400	285.400	338.300		
Cascade	ID	121.050	399.000				
Cedar City	UT	122.200	124.200	125.575	299.200	343.600	346.300
Cedar City	UT	127.350	135.250	135.550	381.450	398.900	
Delle	UT	128.550	132.025	380.050	380.550		
Delta	UT	125.575	370.850	381.450			
Elko	NV	129.725	132.250	269.000	363.150	352.000	
Ely	NV	133.450	397.850				
Fairfield	UT	133.900	370.850				
Francis Pk	UT	119.950	127.700	135.775	257.700	377.150	387.050
Glasgow	MT	126.850	305.200				
Great Falls	MT	132.425	133.400	285.400	319.000		
Green River	WY	124.350	353.500	291.600			
Hanksville	UT	133.600	135.375	269.250	303.600		
Jackson	WY	127.300	132.500	133.250	259.100	285.200	285.600
Judith Mtn	MT	126.850	133.400	285.400	305.200		
Lakeside	UT	133.400	285.400				
Lovell	WY	133.250	285.600				
Malad City	ID	126.750	379.250				
Miles City	MT	126.850	305.200				
Missoula	MT	133.400	285.400				
Myton	UT	119.950	135.775	257.700	377.150		
Rome	ID	121.150	128.050	379.100	387.150		
Salmon	ID	132.400	338.300				
Sheridan	WY	127.750	351.900				
Squaw Butte	ID	128.050	121.50	387.150	399.000		
Sunnyside	UT	125.575	127.925	133.900	370.850	380.350	381.450
Thermopolis	WY	124.350	133.250	285.600	353.500		
Tonopah	NV	125.750	127.900	132.050	291.700	319.800	377.100
Tonopah	NV	133.450	387.850				
Watford City	NV	126.850	305.200				
Wilson Creek	NV	127.950	133.450	134.525	278.100	380.350	397.850
Winnemucca	NV	132.250	363.150	380.050			

Table 2

Salt Lake City International Airport (SLC) Cent				
VHF	UHF			
118.300	257.800	SL Tower		Re
118.450		Air Natl Guard		CI
119.050	257.800	SL Tower		Re
119.200		SLC Int Airport		CI
120.200		SLC Municipal #2		Ap
120.900	257.200	SLC Int		Ap
121.100	319.250	SLC Int		Ap
121.500	243.000	Nationwide		Em
121.600		Civil Air Patrol		EL
121.650		SLC Int		Ge
121.900		SLC Int		Ge
121.975		FSS Advisory		Pr
122.000		SL Center		De
122.100		SL Center		Wa
122.200		SL Center		Co
122.250		Nationwide		Bo
122.400		SL Center		FS
122.500		SL Center		De
122.700		Airport #2		CT
122.725		Unicom		Pr
122.750		Nationwide		Ai
122.850		Multicom		U
122.900		Multicom/Unicom		
		Civil Air Patrol		Se
122.925		Forest Service		Re
122.950		Unicom		
123.025		Helicopter		Ai
123.050		Helicopter		Ur
123.100		Civil Air Patrol		Ad
123.300		Unicom		So
123.500		Unicom		So
123.600		FAA Advisory		Un
123.800		SL Center		Fr
124.300		SLC Int		Ap
124.750		SLC Int		AT
124.900	284.600	SLC Int		Ap
125.400		SL Center		Co
125.700		SLC Int		Fr
126.200		Helicopter Pad		Ai
126.650		SLC Int		Ap
126.750		SL Center		Fr
126.800		SLC Int		VP
127.000		Airport #2		CI
127.300		SLC Int		IF
127.300	387.100	SLC Int		CI
127.475		Forest Service		Re
127.625		SLC Int		AT
127.925		SL Center		Co
128.100		SLC Int		Ap
128.300		SL Center		Fr
128.550		SL Center		Fr
128.875		SLC Int		De
129.425		SLC Int		U
129.500		SLC Int		Un
129.950		SL Center		Fr
130.025		ARINC		Ac
130.400		ARINC		Id
130.600		SLC Int		Sc
130.775		SLC Int		De
131.225		SLC Int		De
131.275		SLC Int		De
131.550		ARINC		Ac
131.750		SLC Int		Sk
132.025	385.550	SL Center		Fr
132.250		SL Center		De
132.550		SL Center		De
132.650	336.400	SL Tower		Re
133.025		SL Center		Hi
133.250		SL Center		Fr
133.450	397.850	SLC Int		SV
133.650		SL Center		Gr
133.900		SL Center		
134.150		SLC Int		De
134.350		SLC Int		TC
134.425		SLC Int		Au
134.500		SL Center		Fr
134.525		SL Center		AR
135.500		SLC Int		Ap
135.550		SL Center		Fr
	284.600	SLC Int		Ap
	307.050	SLC Int		Ap
	322.300	SLC Int		Ap
	353.600	SLC Int		Ap

Abbreviations & Symbols:

ARINC	Aeronautical Radio, Inc.
APP/DEP	Approach/Departure
ARTCC	Air Route Traffic Control Center
ATIS	Automatic Terminal Information Service
AWOS	Automated Weather Observation System
CTAF	Common Traffic Advisory Frequency
Comm	Communications
CON	Control
Deg	Degrees (compass)
EFAS	Enroute Flight Advisory Service
ELT	Emergency Locator Transponder
FAA	Federal Aviation Administration
FSS	Flight Service Station
IFR	Instrument Flight Rules
Int	International
RCO	Radio Controlled Operations
SAR	Search And Rescue
SLC	Salt Lake City
TCA	Time to Closest Approach (Collision Avoidance)
VFR	Visual Flight Rules
WX	Weather
<	Less Than (Under)
>	Greater Than (Above)
,	Feet



Save Your Local Airport!

By Rachel Baughn
Monitoring Times Editor

The little Andrews-Murphy airport – not far from *MT* headquarters in North Carolina – is the perfect site for an ambitious project which hopes to revolutionize general aviation. Andrews is a small airstrip with no tower or radar, ringed by mountain ranges, and prone to bad weather. On the other hand, the area supports several businesses to whom the airstrip means the difference between a quick fly-in or a two-hour drive to the nearest commercial airport. (Not to mention occasionally hosting FBI or media aircraft looking for “America’s most wanted.”)

Andrews was chosen as one of several test sites for SATSLab – the Small Aircraft Transportation System proof of concept project. SATS is a wide-ranging vision for the future of aviation, which includes enabling higher-volume and safer operations at non-towered/non-radar airports. The system is a project of the Southeast SATSLab Consortium whose members include NASA, the FAA, state aviation authorities, aviation companies, aircraft manufacturers, universities and research organizations, avionics and software system companies.

Last October, the system was demon-

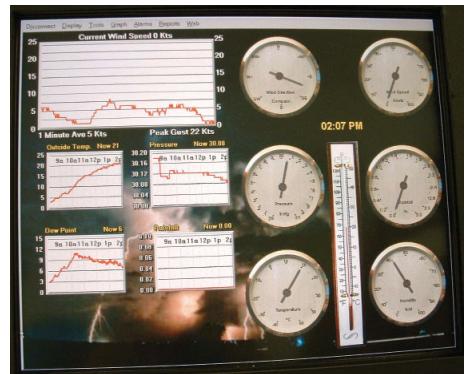
strated to the public at the Andrews-Murphy airport’s first airshow in thirty years, and Bob Grove and I were there for the media preview. First impressions are that this is an exceedingly imaginative and ambitious project – but one with very practical applications for remote areas such as ours. In fact, it could save the airport and the businesses that have moved here.

An article in *Popular Science* magazine stated that one small airport is being gobbled up by urban sprawl every two weeks. Or, if small airstrips don’t lose to urbanization, they may just fade away from neglect and under-use. SATS would reverse the trend toward consolidation in air transportation and revitalize such local airstrips.

The Demonstration

As we watched, a small aircraft made repeated approaches to the strip from all four directions (at least one of which involved a tricky maneuver between two mountains). The pilot performed all four approaches by following a 3-D virtual flight path display called Highway-In-The-Sky (HITS). We in the audience were able to observe on a large screen the same display the pilot was seeing in the cockpit.

In simple, easy to follow graphics and on-screen data, the pilot could see the plane and its relationship to the terrain and to the recommended flight path, as well as any other traffic, weather, or other obstacles. As long as the pilot kept the graphic which represented the plane’s real-time position within the bracketed guide path he was on course to land. By following the path he could safely navigate the plane onto the landing strip from any direction, even at night with no lights or in fog or other low-visibility conditions. The display gives him virtual VFR conditions in graphics very similar to a video game. An inconspicuous trailer houses the



A screenshot of the current weather

instrumentation and software. This is the Airport Communications Technology Trailer, a ground station consisting of servers that acquire information about weather and traffic from live FAA feeds. As the ground station and the pilot’s onboard computer maintain constant communication, the data is integrated into a constantly-changing display of plane and terrain, always in relation to the guide path to the landing strip.

The presenters acknowledged that this project is only now feasible with the graphic displays and software evolved by the video game industry, coupled with advancements in Global Positioning Satellite technology.

The Frequencies

Posted in the trailer was a letter authorizing a number of frequencies for use by NASA Langley Research Center in the SATS program – and coordinated with the local area, of course.

Digital datalink

136.1750 MHz, VDLM2 - 14 kHz bandwidth

966.0000, UAT

VHF for voice control channel

AM: (air-ground voice comm)

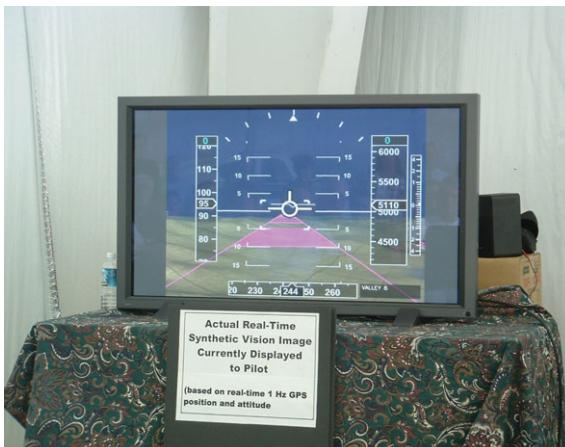
123.1750 for outside 300 km of LFI

123.3750 for within 300 km of LFI

FM: (ground-ground voice comm)



The HITS display retrofitted into the NASA demonstration aircraft (Rachel Baughn)



A large screen shows in real-time the display seen by the pilot as he follows the approach path (Rachel Baughn)

166.1000
166.2250
167.8125
168.3500
171.0000
171.1500
VHF for DGP information transmission
162.8125
170.1250
170.3500
173.5500

Bob Grove noted the following frequencies in use at Andrews-Murphy airport (the digital data channel was not identified):

118.700 Ground control
122.800 UNICOM
123.175 NASA

The Future

It was pointed out that 98 percent of the US population lives within 20 miles of a small airport. If these small strips can be made safer and more reliable for general aviation, they could become an integral part of a less centralized air transportation system with fewer bottlenecks. It could enable on-demand air transport of people, packages, medical services and more. As its purpose states, the goal of SATS is "a safe travel alternative, freeing people and products from transportation system delays by

creating access to more communities in less time."

Ultimately, the vision is a computerized flight control network which would create a kind of virtual interstate system in the sky, populated by air taxis serving any of the more than 5,000 public-use airports which currently cannot handle commercial traffic. For this, the consortium members have begun to develop specially-designed small business jets. The 6-seat Eclipse 500 will be the first out, with others in development.

The SATS system is being tested between several airports in Florida. Five non-towered airports are being tested in North Carolina and one in Oklahoma. Other states such as Virginia may have their own test sites. The Great Plains states with their wide open spaces have a special interest in making their small airports safer and available to commercial traffic.

If you'd like to know more about SATS or see if there is a program in your area, visit <http://sats.erau.edu> or <http://sats.nasa.gov>/ Help save your local airport!



Communicating with the pilot from the ground control trailer (Bob Grove)

Kings of Shortwave Radio



RX-340 "The Ultimate"

The Ultimate HF SWL receiver. 50 kHz-30 MHz. IF stage DSP. Sync AM/selectable sideband, SAM, AM, SSB, ISB, CW, FM. 57 bandwidth filters, programmable AGC, built-in high stability TCVCXO. Completely remote controllable via RS-232 interface. DRM reception capable with no modification needed. 115/230 VAC operation.

\$3,950



RX-320D PC Radio

Model RX-320D adds a 12 kHz I-F output for decoding DRM transmissions to the world famous RX-320 PC Radio. General coverage HF from 100 kHz-30 MHz. "Black box" receiver connects to your PC via one serial port. Your PC provides the operation horsepower. Download the actual operating software from our web site for a pre-purchase test drive.

\$329



RX-350D

New model RX-350D adds a 12 kHz I-F output for decoding DRM transmissions to the original RX-350. 100 kHz-30 MHz. Modern IF-DSP architecture accommodates 34 built-in bandwidth filters, DSP automatic notch, and DSP noise reduction. Flash ROM updateable via Internet file downloads. Large LCD graphics panel for display of all receiver functions. Selectable sideband/Sync AM, SAM, AM, FM, CW, and SSB modes. Momentary SWEEP function shows band activity on LCD screen. 1024 memories. Timer and squelch activation circuitry. 12/24-hour clock. Hi Z and Lo Z antenna inputs. 115/230 VAC or 13.8 VDC operation.

\$1,199



302 REMOTE/ENCODER KEYPAD

Allows armchair tuning of the RX-350. Function buttons allow operation of various receiver controls. Direct frequency entry via keypad.

\$139



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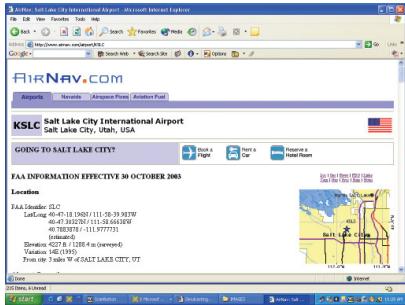
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Air Traffic Control Simulcasting

By Iden Rogers

Listening to VHF / UHF aircraft communications can have a number of confusing aspects. If you are hearing the controller but not all the aircraft, you may be listening to an example of simulcasting. In simple terms, simulcasting is intentionally transmitting on more than one frequency when the microphone is keyed and, of course, listening on those same frequencies.

Only controllers will simulcast: Aircraft must transmit on only one frequency at a time when talking to controllers.

There are two basic circumstances when a controller will simulcast. One is when the controller is likely to encounter both civil (private, airliners, and cargo) aircraft as well as military aircraft in the same control area or airspace. The other is when, due to periods of reduced activity, adjacent areas are combined or related functions are combined. Let's explore these.

Mixing in the Military

While on the ground or while flying over land, civil aircraft are restricted to the VHF aircraft band (118-137 MHz) for Air Traffic Control (ATC) communications. Military aircraft commonly operate in the UHF band (225-400 MHz) though they may use either band, assuming that a particular aircraft has equipment installed for both bands.

Some listeners new to aircraft listening may hear controllers on UHF talking to airliners and can falsely assume that the airliners are also on the UHF band. Maybe the following will help illustrate how this all fits together.

The Air Traffic Control Network

In simple terms, the sky over land here in the U.S., is divided up into three-dimensional, irregularly-shaped geometric chunks of sky called "sectors." Controllers, at their scopes in rooms with low-level lighting and constant chatter, handle both civil and military aircraft in the respective sectors in their charge. If an aircraft is enroute – that is, between departure and approach roles – the pilot will be in contact with a controller for the particular Air Route Traffic Control Center (ARTCC) sector that the plane is in.

Each ARTCC has many high and low altitude sectors, each with its own VHF / UHF frequency pair. When a controller is talking to a civil aircraft on VHF, the same transmission is also sent out on the paired UHF frequency. Likewise, when a controller is talking to a military aircraft on a UHF frequency, it also goes out on the VHF frequency. You have to listen to both frequencies to hear all the aircraft.

Terminal Radar Approach Control (TRACON) facilities control air traffic during aircraft approaches to and departures from airports, and they, too, have VHF / UHF frequency pairs for each of their sectors. Besides ARTCCs and TRACONs, VHF / UHF simulcasting also exists at military airfields and a percentage of larger civil airports. Many smaller civil airports with a tower will have a UHF tower frequency for emergencies and occasional military landings on 257.8 MHz, but will not have multiple VHF / UHF frequency pairs.

Frequency Pairs

Part of the fun of the hobby is to figure out all the VHF / UHF frequency pairs for the ARTCC, TRACON, military airfields, and airports in your listening area. AirNav.com can be of considerable help at <http://www.airnav.com/airport/>.

As an example, look at the information for Denver International Airport at <http://www.airnav.com/airport/KDEN>:

DENVER APPROACH: 119.3(NORTH)

120.35(SOUTH) 307.3(NORTH)

381.5(SOUTH)

DENVER DEPARTURE: 127.05(NORTH)

363.25(NORTH).

The VHF / UHF frequency pairs are easy to figure out in this example.

Again, the UHF frequencies exist at some civil airports for any military aircraft that use those airports. A controller probably could configure his or her console to transmit on VHF to civil aircraft and transmit on UHF to military aircraft, but by simulcasting, it helps all pilots in a given sector or control area to be more aware of what is going on around them and to know when the controller may be busy talking to an aircraft on the other band.

Temporary Consolidation

The other instance of simulcasting occurs during periods of low air traffic at which time, for example, two or more TRACON sectors may be combined. One controller will handle what two or more controllers cover at busier times. If three sectors are combined, you are likely to hear the same controller simulcasting on three VHF frequencies and three UHF frequencies. To hear all the aircraft in contact with him or her, you will need to monitor all six frequencies.

If you hear a TRACON controller and not the aircraft, it's time to explore for the frequencies you are not monitoring that are part of the simulcast group. As the day gets busier, the sectors will once again be broken up into independently-operating sectors with separate controllers and continuing with the frequency pairs

unique to each.

The more familiar you become with a particular facility, the quicker you will be to recognize when sectors are combined and when they are not. You will hear controllers who are controlling more than one sector say "Contact me now on my freq xxx.xx." In other words, he is handing off the aircraft to another sector, but yet to himself, since he is controlling that sector as well. Aircraft must communicate on the frequency that is assigned to the sector it is in, even if sectors are combined and it's the same controller.

Another common consolidation during periods of low activity is to combine Clearance Delivery, Ground Control, and Tower. That is, one controller will accomplish all three functions that, at other times, might be handled by three people separately. Sometimes Clearance Delivery and Ground Control will be combined, but the Tower will remain separate.

When we look at Sacramento International Airport (<http://www.airnav.com/airport/KSMF>) as an example, we see:

CAPITOL GROUND: 121.7 256.7

CAPITOL TOWER: 125.7 256.7

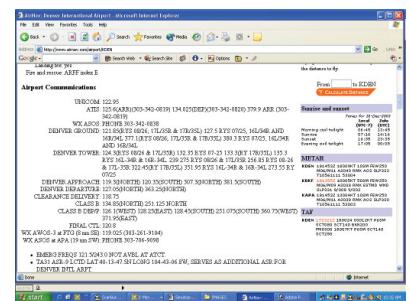
CLEARANCE DELIVERY: 121.1 256.7

If you were to listen on one of these frequencies during a time when they were simulcasting, you would hear the controller, but only some of the aircraft. Note that the UHF frequency is the same for all three functions. If this civil airport had more frequent military traffic, it would have additional UHF frequencies.

Of course, all the above assumes that you are within receiving range of an airport or ATC facility. As distance from the transmitter increases, the aircraft on the ground are the most difficult to hear, followed by the ground stations, leaving the aircraft in the air as the easiest to hear – particularly those at higher altitudes.

Aircraft listening is more enjoyable when both sides of the conversations can be received. This isn't always possible, but understanding simulcasting and then learning all the frequency pairs can go a long way in helping you to hear both sides. Another important factor in hearing both sides is the type and height of your receiving antenna(s). This can be a topic for later discussion. Watch for the new "plane" component of *Boats, Planes, and Trains* coming next month, and send your aero questions and contributions to the author at idenrogers@monitoringtimes.com or in care of this magazine.

For simplicity, this article doesn't differentiate between Visual Flight Rules (VFR) and Instrument Flight Rules (IFR) and how that relates to air traffic control.



Highway Maintenance Service

This month's *Service Search* column will be taking an in-depth look at the new highway maintenance service frequency allocations currently being licensed by the Federal Communications Commission. Scanner listeners should be listening for newly allocated splinter channels (VHF 7.5 kHz/UHF 6.25 kHz) to become active in their areas.

With the increased inclement winter weather we are now experiencing, these highway maintenance allocations can be exciting frequencies to monitor road construction/snow removal operations.

33.02	Base or mobile	One-way paging on secondary basis	151.055	Base or mobile	15 kHz bandwidth authorized
33.06	Base or mobile	One-way paging on secondary basis	151.070	Base or mobile	
33.10	Base or mobile	One-way paging on secondary basis	151.085	Base or mobile	Bandwidth not to exceed 11.25 kHz
37.90	Base or mobile		151.0925	Base or mobile	Bandwidth not to exceed 11.25 kHz
37.92	Base or mobile		151.100	Base or mobile	Bandwidth not to exceed 11.25 kHz
37.94	Base or mobile		151.1075	Base or mobile	Bandwidth not to exceed 11.25 kHz
37.96	Base or mobile		151.115	Base or mobile	Bandwidth not to exceed 11.25 kHz
37.98	Base or mobile		151.1225	Base or mobile	Bandwidth not to exceed 11.25 kHz
45.68	Base or mobile		151.130	Base or mobile	Bandwidth not to exceed 11.25 kHz
45.72	Base or mobile		151.1375	Base or mobile	Bandwidth not to exceed 11.25 kHz
45.76	Base or mobile		156.045	Mobile	
45.80	Base or mobile		156.0525	Mobile	Bandwidth not to exceed 11.25 kHz
45.84	Base or mobile		156.060	Mobile	
47.02	Base or mobile	State/Local only secondary basis to work with state	156.0675	Mobile	Bandwidth not to exceed 11.25 kHz
47.04	Base or mobile	State/Local only secondary basis to work with state	156.075	Mobile	
47.06	Base or mobile	State/Local only secondary basis to work with state	156.0825	Mobile	Bandwidth not to exceed 11.25 kHz
47.08	Base or mobile	State/Local only secondary basis to work with state	156.105	Base or mobile	
47.10	Base or mobile	State/Local only secondary basis to work with state	156.1125	Base or mobile	Bandwidth not to exceed 11.25 kHz
47.12	Base or mobile	State/Local only secondary basis to work with state	156.120	Base or mobile	
47.14	Base or mobile	State/Local only secondary basis to work with state	156.1275	Base or mobile	Bandwidth not to exceed 11.25 kHz
47.16	Base or mobile	State/Local only secondary basis to work with state	156.135	Base or mobile	
47.18	Base or mobile	State/Local only secondary basis to work with state	156.1425	Base or mobile	Bandwidth not to exceed 11.25 kHz
47.20	Base or mobile	State/Local only secondary basis to work with state	156.165	Base or mobile	Assignment for licensees other than the state
47.22	Base or mobile	State/Local only secondary basis to work with state	156.1725	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
47.24	Base or mobile	State/Local only secondary basis to work with state	156.180	Base or mobile	Assignment for licensees other than the state
47.26	Base or mobile	State/Local only secondary basis to work with state	156.1875	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
47.28	Base or mobile	State/Local only secondary basis to work with state	156.195	Base or mobile	Assignment for licensees other than the state
47.30	Base or mobile	State/Local only secondary basis to work with state	156.2025	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
47.32	Base or mobile	State/Local only secondary basis to work with state	156.225	Base or mobile	Assignment for licensees other than the state
47.34	Base or mobile	State/Local only secondary basis to work with state	156.2325	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
47.36	Base or mobile	State/Local only secondary basis to work with state	156.240	Base or mobile	Assignment for licensees other than the state
47.38	Base or mobile	State/Local only secondary basis to work with state	156.2475	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
47.40	Base or mobile	State/Local only secondary basis to work with state	158.985	Mobile	Assignment for licensees other than the state
			158.9925	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
150.995	Base or mobile		159.000	Mobile	Assignment for licensees other than the state
151.0025	Base or mobile	Bandwidth not to exceed 11.25 kHz	159.0075	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
151.010	Base or mobile		159.015	Mobile	Assignment for licensees other than the state
151.0175	Base or mobile	Bandwidth not to exceed 11.25 kHz	159.0225	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
151.025	Base or mobile		159.045	Mobile	Assignment for licensees other than the state
151.0325	Base or mobile	Bandwidth not to exceed 11.25 kHz	159.0525	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
151.040	Base or mobile		159.060	Mobile	Assignment for licensees other than the state
151.0475	Base or mobile	Bandwidth not to exceed 11.25 kHz	159.0675	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
			159.075	Mobile	Assignment for licensees other than the state
			159.0825	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
			159.105	Mobile	Assignment for licensees other than the state
			159.1125	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
			159.120	Mobile	Assignment for licensees other than the state
			159.1275	Mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz
			159.135	Mobile	Assignment for licensees other than the state
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			159.195	Base or mobile	Assignment for licensees other than the state
			159.2025	Base or mobile	Assignment for licensees other than the state/Bandwidth not to exceed 11.25 kHz

Tuning the FM Band: The Basics

Mtreader Bernice Bernotat recently wrote, "I'm a life-long radio listener who never paid much attention to what radio I was using because I lived in areas where there was no problem with reception. Now, however, I live in a canyon...180 miles south of Seattle (which is where the nearest NPR station is located) and would love to find a way to listen to radio without all the interference. I'm currently using a Quasar GX3636 with which I can hear NPR pretty well in the morning-with lots of background noise....What would you recommend in my situation? Also, I wouldn't mind spending a little more and getting SW too..."

◆ A Tale of Two Bands

Although nearly all radios have both AM and FM tuning ranges, the two bands couldn't be more different. The AM band dwells in a very low frequency range 530-1700 kHz and the FM band is in the very high frequency range 88-108 MHz. Not only that, but the transmission modes are completely different, as are the characteristics of their respective bands.

AM waves are very long and can "bounce" along the layers of the ionosphere for a thousand miles or more while FM waves are very short and are "line of sight," meaning that your antenna must be able to "see" the tower in order to collect a signal. Of course, there is some slight refraction, but, it's not much.

Reception on the FM band varies greatly depending on where you live. For instance, most people live in an urban or suburban environment where FM stations are closely packed on the band and powerful transmitters are perhaps only 10 miles from your radio. These locations can suffer from receiver overload where the signal swamps the receiver. Anything more than a small whip antenna only increases the problem. But, for rural folks, like Bernice, reception of any FM signal is a big challenge.

◆ Three Tuning Options

Being an Easterner I had to ask Bernice what she meant by "living in a canyon." She obliged by sending several great photos of the view from various directions at her house. If you've ever seen the movie "A River Runs Through It" you can imagine where she lives. In fact, she says, "...I just found out that this area here was the last one in the entire U.S. to have the mail delivered on horseback...until 1956 when they finally

brought electricity down here..." She says her elevation is 1,500 feet but the canyon walls are 3,000 feet and that her neighbors up there have no problem with radio reception.

Having seen the pictures I have to say it's a miracle she can get any reception at all and I have no idea what the folks living at the bottom of the canyon are doing for reception. Of course, the reason her neighbors get such good reception is that they have a better line-of-sight to the transmitting antenna. However, I've come up with three ways to solve the problem of poor FM reception which should be applicable to most readers' situations.

◆ The Outdoor Antenna Option

The first option is to install an outdoor FM antenna with a mast-mounted pre-amplifier. You can get all the parts for this at Radio Shack. There are FM antennas available which are designed just for the FM band, but since the FM band is located between VHF TV channels 6 and 7, I recommend using a TV antenna because this means you'll get improved over-the-air TV reception as a bonus.

Bernice lives in what's called a "fringe" reception area – that's the limit to which an FM signal can travel and still be reliably received. For this, Radio Shack's VU-190 XR FM/TV:UHF/VHF antenna (about \$100) is recommended. If you live in an area within 60 miles of the station, a lesser antenna can be used with acceptable results.

To this I suggest adding the high-gain antenna mounted signal amplifier (RS#15-1109 \$70) and enough 75 ohm coax cable to go from the antenna to the place in the house where your radio is located. I recommend RG/6 coax because it has less loss at VHF frequencies per hundred



Radio Shack's high-gain mast-mounted antenna amplifier makes the most difference in signal quality. (Courtesy Radio Shack)

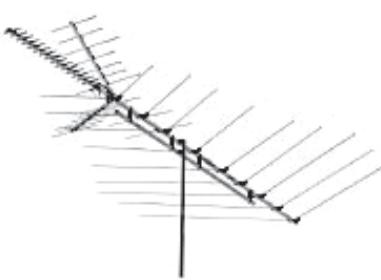
feet of run, and with antennas, any time you can limit loss you're ahead of the game.

While reception will be improved with the antenna alone, you'll find the preamp makes a tremendous difference. When you use the antenna-mounted preamp you're amplifying the signal at the antenna before it has a chance to get lost in the lead-in.

A preamp of any kind is *not* recommended if you live in a suburban area because such an increase in signal could result in receiver overload which will, in turn, result in decreased signal quality. There are many mast-mount preamps on the market, so look for the one which offers the most gain in the frequency range most important to you. Gain is usually expressed in dB with the higher number offering the most gain.

The next thing you'll need is the hardware to support the antenna. In most applications you can use one ten foot mast (RS#15-863 \$15) attached to the gable end of the house using a set of 4- or 8-inch wall mounts (RS#15-886 \$11), depending on the overhang of your roof.

If you tend to listen in only one direction, simply point the antenna in that direction, rotating it by hand for strongest signal and locking it down. If you need to tune stations from different directions you'll need an antenna rotator (RS#15-1245 \$70). In this case you'll need an additional 5 or 10 foot section of mast as the rotator sits atop one section and the second mast is mounted into the rotator with the antenna mounted atop that.



One-stop antenna: FM/TV:UHF/VHF. Radio Shack's VU-190 for fringe reception. It's great for FM and you get improved TV as a bonus! (Courtesy Radio Shack)

◆ The New Receiver Option

In general, a high quality stereo receiver/amplifier will have a better FM tuner and yield better reception. Today these receivers have a lot of extras such as remote control, digital tun-



JVC-RX-318BK Stereo receiver tunes FM band at a reasonable price. (Courtesy JVC/Crutchfield)

ing with 10 or more station presets and also give you great audio for a CD/DVD player or your VCR. The big drawback is that you'll need external speakers. But, prices on good quality receiver/amps are fairly low. You will find that popular models such as the Sony STR-DE185 (\$185) or the JVC RX-318BK (\$180) will do nicely.

Your local Circuit City, Best Buy, Tweeters or similar consumer electronics store will have them at competitive prices. If you don't have such a store near you, try Crutchfield, the national catalog electronics outlet. Call 800-955-

FM Antenna Installation Tips

A word of caution: antennas and antenna masts are great conductors of electricity. DO NOT install an antenna anywhere near electrical wires. When doing outdoor antenna work try to have another person help you. You may need someone to hold a ladder steady or tell you if the signal's coming in well or to hand up tools.

If you have a set of FRS radios you'll find them of great value when orienting the antenna for best reception. Most radios have just a stereo light as a signal strength indicator, so you'll have to do it by ear. Tune for the least amount of hiss on the weakest stations.

Use plastic cable ties to secure the coax to the mast to keep it from flopping around in the wind. Use a plastic "through-wall" tube to bring the lead-in into the house above the baseboard. Use extreme caution when drilling through walls to avoid hitting live electric house wires. Always form a drip loop with lead-in wires to avoid rain entry into the house.

TV antennas are big and exert a great deal of torque in the wind. Avoid using a brick or masonry chimney as a support. Over the years the antenna will actually crack the mortar in such chimneys, requiring extensive repair.

Drive a ground rod under the antenna mast and connect the two with a heavy ground wire. This is not a guarantee that your antenna won't be struck by lightning. In the event of an electrical storm, disconnect the antenna from the radio and unplug the antenna amplifier from the wall. Physically isolate the antenna from your equipment and the house wiring.

Properly installed, you should get 10, 15 or even 20 years service from your antenna. If you notice degraded reception, the most likely cause is the cable fitting at the antenna. Be sure to use the supplied weather boot on the coax fitting when doing the installation.



Sony STR-DE185 looks expensive but is moderately priced. (Courtesy Sony/Crutchfield)

6000 to order a catalog or view their available models and prices on-line at <http://www.crutchfield.com>. It pays to shop around because prices on these items vary widely and they're often on sale.

If you're also interested in tuning in the shortwave bands, as is Bernice, I recommend, instead, a portable shortwave receiver such as the Sangean ATS909 (\$240-260) or the Sangean ATS505P (\$110-130). You can check out these models at C Crane (800-522-8863 <http://www.ccrane.com>) or Grove Enterprises (800-438-8155 <http://www.grove-ent.com>). When attached to the above antenna, the receiver will give you vastly improved FM reception, and the built-in whip antenna will give you moderate reception on the big international shortwave broadcasters. These radios provide moderate reception on all bands and they are reasonably priced.



Sangean ATS505P shortwave receiver has an adequate FM tuner built-in and you get shortwave as a bonus! (Courtesy Sangean/Grove)

◆ The Ultimate Solution

And that brings me to the ultimate option: Sirius satellite radio. I've been subscribing to both Sirius and XM for nearly a year and I prefer Sirius over XM. Here's why: Sirius offers three channels of public radio (NPR News, NPR Talk and PRI). XM has none. Sirius has more balanced political talk channels including Sirius Right (for conservatives) and Sirius Left (for liberals). It has all the usual ABC talk radio channels, but it also has Radio Amiga which carries Free Speech Radio and Democracy Now. On the shortwave side, Sirius offers BBC World Radio News and World Radio Network (WRN) with its line-up of shortwave broadcasts from around the world on a rotating schedule. And, when it comes to music, Sirius wins again: 60 channels of commercial-free music, which is the main reason I want to listen to music on satellite.

OK, there's a price for all this great programming. It will cost \$12.99/month for Sirius

(\$3 more than XM). So, you have to figure out just how important this type of programming is to you. The equipment to receive Sirius is not that expensive and is consistently coming down. Again, check the big consumer electronics stores and you'll find plenty of discounts and mail-in rebates.

Typically, a tuner can be bought for under \$100 and a home docking station for \$60 or less. The advantage of having both a home and car docking station is that you can just pop the tuner out of one and pop it into the other. Reception at home or in the car is excellent and it's really easy to become addicted.

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◆ More on AC vs. DC relays

In our December column, I was a little too sloppy in saying that you can use an AC-rated relay on DC. My explanation was essentially correct, but sharp-eye reader Tom Lamb, K8ERV, advised the following:

Alternating current (AC) continuously switches polarity (+ or -) 60 full cycles every second. When a relay opens during the zero-crossing phase (momentarily there is no voltage present), there isn't even a spark. If you open the contacts under direct current (DC; the current and voltage remain constant), there can be quite an arc drawn which can weld or destroy the contacts.

Certainly there are relays for DC, but they have more substantial contacts to dissipate the heat during the break than are required for AC. In addition, some DC relays employ "blow out" magnets near the contacts to help extinguish the arc.

Thanks, Tom.



Q. Why do drop-outs occur on cell phones? Is it only because of poor signals? (Mark Burns, Terre Haute, IN)

A. Minimum quality standards must be observed in commercial telecommunications equipment. If weak signals start causing erratic conversations, the system cuts you off until you are in a better location where you can redial, or receive a more reliable call.

But if the next cell (tower) is already fully loaded with users, you may be refused or cut off there as well.

Q. I have a Yacht Boy 400 which suddenly stopped receiving all AM

stations and left only a background static hiss. All other functions including FM and shortwave work fine. With the external antenna plugged in it works fine, but on removing the external antenna it returns to a background hiss. What would you suggest as to the cause and the cure? (Bill Rickman, Edina, MN)

A. Sounds as if the antenna jack is not making connection to the internal loop when you pull out the jack. This is the result of frequent in/out plugging gradually stretching the little spring contact in the jack away from its other contact point. Try wiggling the little spring contact with a small needle or other object to see if that makes and breaks the signals.

If that's the culprit, you have two choices:

(1) With a stiff steel wire, probably bent into a right angle at the intruding end, bend the spring contact back to the place it's touching (or raise the place it's touching to the spring contact, or both!).

(2) Replace the jack.

Q. I would like to built a simple vertical wire antenna for mounting on a pole 30 feet tall for SWLing the different bands. Any ideas? (Greg Gilbert)

A. The simplest vertical is a wire suspended from a high tree branch, raised by a cord attached to a rock or an arrow projected, then used to pull up the wire. It's a good idea to attach a ground rod out there as well, although the roots pose a problem, so the rod can be sunk a little farther away. The purpose of the ground rod is to reduce electrical static; it will not make signals stronger.

I once made a very effective vertical using two or three sections of TV mast pipe bracketed to the side of the house and attached to a coax lead-in at the bottom with a bolt in a drilled hole. Again, it's a good idea to put the ground rod under it.

Another gimmick is to set the bottom of the mast pipe over the top of a thick-walled, glass beverage bottle buried to its neck alongside the house; you only need one bracket a few feet higher to keep the mast-pipe vertical from falling.

Yet another possibility is to use lightweight electrical conduit for the vertical, securing it to a PVC roof vent with two wraps of plumbing strap. The coax center conductor can

be attached to a screw and nut run through one of the holes in the strap.

The Coast Guard once demonstrated that they could receive all communications from 3-30 MHz with a six-foot whip, so as you can see, the length is not critical. Sure, the impedance is very low, but all that means is that the signals as well as the noise (background hiss) will both be lower than if you had a resonant system, but who cares? If you want higher signal and noise, just turn up your volume control!

Q. I just built an RF preamplifier kit that is powered by a nine-volt battery. The instructions say it draws 15mA, so how long can I expect the battery to last? Is there an easy way to check the battery without actually opening the case? (Ed Bixby, El Segundo CA)

A. The functional lifetime of a battery is dependent not only on the current drain, but the minimum voltage to which the battery can drop before it affects performance. Assuming that the preamp can probably continue to operate down to 7 volts or so, a fresh alkaline battery should last for a good many hours.

While it would be difficult to predict what observable effects you would notice on your preamp from a battery that has dropped voltage too low, they would most likely include signal weakening, and could also include increased intermodulation (signal overload) interference.

You can't tell what the voltage is without actually measuring it, but if the device is equipped with an external power jack, it's just possible that you can measure the voltage there. Some designers use a circuit-breaking contact to avoid applying external power to the internal battery, however; so that's something you will have to check. If it has that fail-safe precaution and you know you will avoid frying batteries by removing them before plugging in an external power supply, you may wish to rewire the jack so that the battery remains connected when a plug is inserted into it to measure the voltage.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. If you desire a prompt, personal reply, mail your questions along with a self-addressed stamped envelope (no telephone calls, please) in care of MT, or e-mail to bobgrove@monitoringtimes.com. (Please include your name and address.) The current Ask Bob is now online at our website: <http://www.monitoringtimes.com>

Getting Started

Bright Ideas

Gary Webbenhurst

P. O. Box 344, Colbert, WA 99005-0344

garywebbenhurst@monitoringtimes.com

8

Reader Allen Lutins sent this: "I'm an avid reader of your *Bright Ideas* column in *Monitoring Times*. I have an alternative suggestion to your labeling methods. I buy 'full sheet labels' which consist of 8-1/2" x 11" sheets that are covered in a single, large label. I then print my labels of whatever size, including outline box, onto the sheet, and then cut them out. Formatting conventional labels, precisely centered, etc., can be quite tricky, and you can always print a few projects' worth of labels on a single sheet." Thanks, Allen!

9

I never throw anything away. At least not until I have a chance to cannibalize, and disassemble all the spare parts. Cords, screws, wires, resistors, etc. Remember to ask neighbors, and friends to save their broken down electronic gizmos. Cell phones usually come with several re-usable parts, especially the old bag phones (battery). Alternatively, the cellular phones can be donated to domestic violence programs where their 911 feature may save lives.

I keep all these odds and ends in a large plastic see-through bin. A real diamond is the soft foam used in packing computers, TVs, and other large fragile items. You can cut and mold this material for a variety of projects. I just carved out a custom radio stand for my desktop. This foam also provides custom padding protection for packing your radio into travel bag.

10

Looking for a sturdy outdoor or mobile VHF (150-165.MHz) antenna? West Marine Supplies has many radio related items for the harsh marine environment. Their antennas are made for the NOAA Weather and Marine channels in that frequency range. Look up <http://www.westmarine.com/> for their store locator. Not cheap, but they will stand up to just about anything but a tornado.

11

Do you ask yourself, why me? It seems that most everything I own eventually breaks. The knobs fall off, the plastic foot breaks off, the pin falls out of my BNC antenna.

You can probably guess that superglue is a good friend. I use a toothpick to transfer the glue in the correct amount to the right place.

This morning the hinged cover on my RS voltmeter fell out. It was held in place by two small pins, one of which had disappeared. I used to cut off the end of a safety pin or paper clip for these types of repairs. But I remembered I had just put away the Christmas ornaments. What about those little hooks for the ornaments on the tree? I cut one to size, and it worked perfectly. And I saved the safety pin for a bigger job!

12

For Super Bowl Sunday, we went through lots of chips. When I cleaned up, I noticed the chip dip came in a small glass jar. I find many uses for these jars, such as a holder for small parts. I also used another to hold my AA batteries: one for those already charged, and another with those waiting to be recharged. Yes, I labeled the jars.

13

I recently worked with some Red Cross volunteers to assist them in earning their ham licenses. They felt they needed more hands-on knowledge. So I cleared off the kitchen table and invited about six newbies over to my house. I was amazed at how much they learned. We were all so happy with the process, they came back two weeks later for another session. This session included soldering some simple power cords and speakers.

14

Do you have some radio knowledge to share? Why not invite some new hams or monitoring enthusiasts over to your house for an elmering session? If you are the person who needs some help, find someone willing to teach you the basics, and perhaps even the advanced stuff.

15

Speaking of the Red Cross, our Spokane chapter just took possession of a new Emergency Communications Response Vehicle, the E-CRV. This is no toy. Built on a Ford Excursion chassis, it features a 52 foot telescoping mast with camera and antennas, a DSS and VSAT system, and 13 radios! An 800 watt AC Aura generator is under the hood powered by a massive diesel engine. I will save the details for a feature article I am writing. SEE PHOTO!

16

On a whim, I decided to look up the ham callsigns of some old friends – a quick and easy process at <http://www.qrz.com>. Sure enough, a few of them needed to renew their ham licenses. A couple had actually expired, but were within the two year grace period. So if you know of any inactive hams, check the database. Their interest in ham radio may have drifted away, but remind them to renew their license. They will thank you for it. They can do so for free at the FCC website or contact the ARRL.

17

I love "road trips." I like to spend a minimum of 24 hours in an area. I purchase a local map, usually at Wal-Mart (look for maps near the checkout counters). While listening (researching) the local frequencies, I use the map to connect street names with the frequency, and it helps in confirming the agency using the frequency.

I use a "table" in my word processor to record all the frequencies, and PL, or DCS tones. My Pro 92 and 2067 do a great job at instantly identifying the tone. I use these scanners with my preprogrammed public safety pool of all available VHF low and high and UHF frequencies. The radio technicians occasionally make my task interesting because they may use one PL for the repeater input, and a different one for the repeater output. Heck, in Idaho they even use uncommon frequencies, like 465.475 as the input and 460.275 as the output. Strange, but confirmed, if you know what I mean. I love this game!

Speaking of road trips, see you in Kupsville!



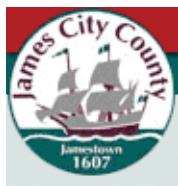
Sharing the Cost of Connectedness

New trunked radio systems are expensive. Costs in the millions of dollars are the norm, even for relatively small municipalities. This month we'll take a look at some jurisdictions that are saving money by working together to share infrastructure and network costs and wrap up with a couple of systems that aren't quite meeting their performance expectations.

◆ James City and York Counties, VA

The Virginia Peninsula in southeast Virginia is home to two counties that are working together to implement a \$20 million Motorola public safety radio system. Located in the Williamsburg area along Interstate 64 east of Richmond, York County covers 108 square miles and has a rapidly growing population of more than 56,000 people. James City County, just west of York County, covers 144 square miles and is home to more than 49,000 people.

James City County began their planning process eight years ago when it recognized the need to replace a number of aging radio



systems. The county declared that the old systems were "unreliable, inadequate and incapable" of meeting present and future needs and could not even meet standard coverage performance (95 percent reliable 95 percent of the time for street or in-building operation). In addition, greater than half of the fielded equipment is now more than 15 years old and much of that is more than 20 years old. Such "vintage" equipment creates a difficult and expensive situation for maintenance and repair, often requiring used and worn replacement parts and quite a bit of down time.

On top of that, the police and fire departments each had only two radio channels, leading to congestion and delays during busy times of the day. Such separation also makes it difficult for police officers, firefighters and paramedics to communicate directly with each other.

At the same time, York County was facing similar problems with inadequate coverage, limited capacity and old radio equipment. The two counties decided to work together to find a replacement for each of their systems.

M/A-Com and Motorola both submitted proposals. At the end of 2003 both counties accepted the Motorola bid for a mixed analog and digital system with nine repeater

sites and 20 radio channels. The system is expected to be completed late this year and should allow police, fire and other emergency personnel to communicate directly with each other. The selection of a Motorola system will also ease the task of communicating with other nearby cities including Newport News, Richmond and Virginia Beach.

Initially as many as 1,600 users are expected to join the system, with another 400 coming on after the system is fully operational. The plan specifies nine repeater towers, which will need to be built out and connected via microwave links to dispatch centers in both counties.

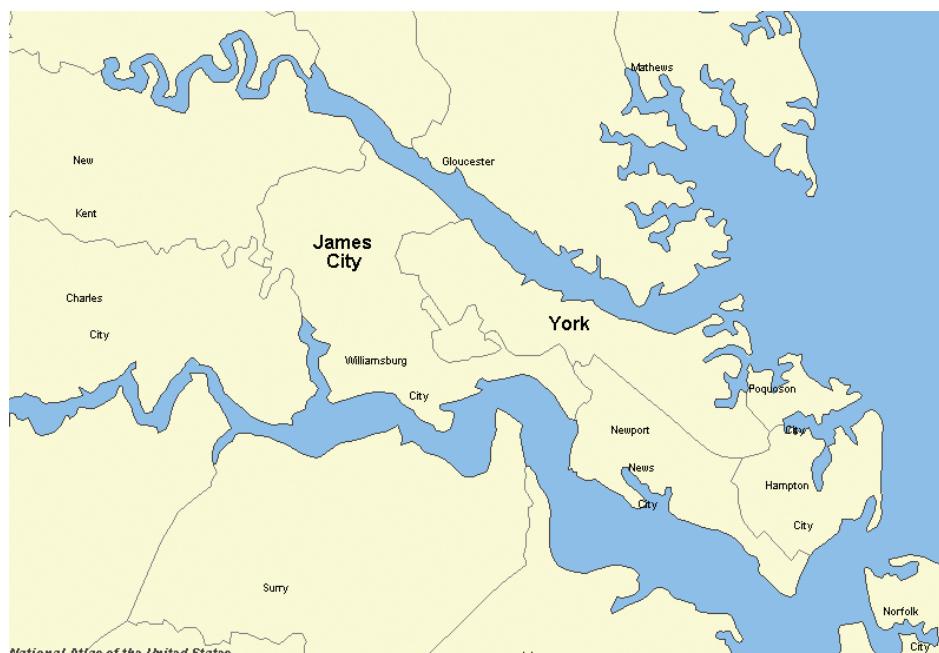
The joint network will be the first radio system in that area of Virginia to use APCO Project 25 protocols. Project 25 is a set of standards that allows public safety radios to communicate with each other regardless of equipment manufacturer.

Financial estimates indicate that the counties will save at least \$2.5 million compared to what it would have cost each county independently to set up an equally capable system.

York County has three sites in the FCC database (one in Williamsburg, two in Yorktown) on the following frequencies: 866.2500, 867.2625, 867.3250, 867.3500, 867.7750, 867.8750, 867.9500, 868.5250, 868.5375, 868.6625, 868.8000 and 868.8125 MHz. In James City County there are three sites (one in Toano and two in Williamsburg) assigned to 867.1250, 867.1750, 867.3750, 867.6000, 867.8500, 867.9000 and 868.3625 MHz.

Until the new system is up and running, you can find James City County Police dispatching on 453.100 MHz and also using 453.250 MHz. Fire dispatch is 154.355 MHz and mobiles also use 154.070 MHz. Over in York County, the Sheriff's Department is on 453.150 MHz while Fire dispatch is on 154.010 MHz. Fireground is listed as 154.400 MHz.

The Williamsburg/James City School System operates a Logic Trunked Radio (LTR) system on the following four frequencies: 866.3750, 866.5125, 868.6375 and 868.7750 MHz. Reported traffic, as you might expect, is mostly to and from school buses. Listening to buses on cold, snowy days can often be helpful to keep track of road conditions and to know when your children



need to be at the bus stop.

The Virginia State Police uses 159.165 MHz on the Peninsula.

The nearby city of Norfolk operates a Motorola Type III trunked radio system on 852.1625, 853.1625, 855.2375, 855.4875, 855.7375, 856.2375, 856.9875, 857.2375, 857.9875, 858.2375, 858.9875, 859.2375, 859.9875, 860.2375 and 860.9875 MHz. Fire dispatch is on a Type II talkgroup of 64784 (hex FD1) and Emergency Medical Services on 64752 (FCF), but I don't have current information for police operations.

◆ South Dakota

While most new digital systems can be found in the 800 MHz band, South Dakota has built a statewide system operating in VHF (Very High Frequency) around 150 MHz. It was launched in October of 2002 and now has more than 8,000 users across 500 local agencies and departments. Traffic

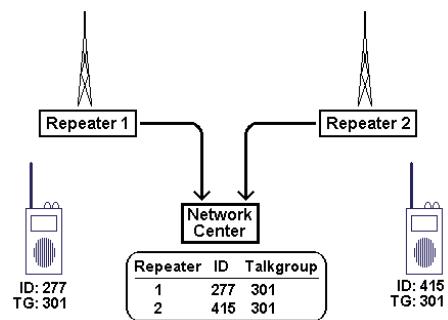
now exceeds one million calls a month.

The system implementation plan includes 35 initial repeater sites and seven expansion sites to cover each of the 66 counties in the state. Each repeater site is connected via microwave link to a network center in the state capital of Pierre.

The digital radios used in South Dakota each have a unique identification number. Each radio is also programmed with one or more talkgroups that specify those conversations in which the radio may be used.

When a radio is first powered on it registers with the nearest repeater in a process called *affiliation*. The affiliation message includes the radio ID and the talkgroup the user has selected. That message goes to the network center where a database keeps track of where each radio is located and which talkgroup the user selected.

When a user begins talking, the voice traffic is transmitted to the nearest repeater and



Network Database of Radio Affiliations

sent to the network center. The network center then relays the voice traffic to every repeater that has a radio registered for that talkgroup. This allows any user to communicate with any other user anywhere in the state as long as they are both in the same talkgroup. This capability also allows messages to be broadcast to all parts of state, for alert and other urgent messages.

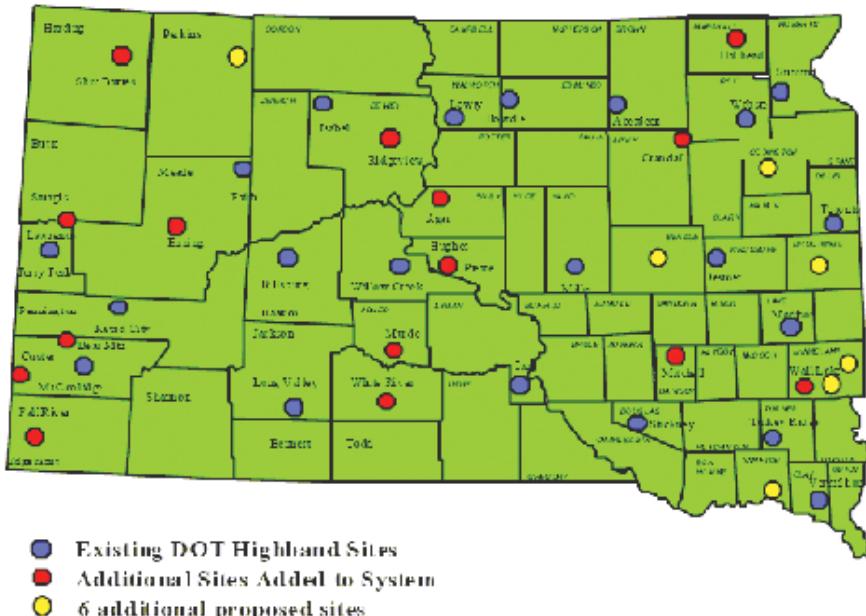
Each repeater site has at least four trunked radio channels. One is used as a control channel to carry signaling and activity information, leaving at least three for voice traffic. The state used a loading estimate that an average transmission lasts between 5 and 10 seconds and that a single channel can support as many as 100 users. The state has promised to add additional channels at sites that exceed their capacity. Each repeater site also has a dedicated data channel for use by mobile data terminals, operating at 9600 bps (bits per second).

For agencies that are still using the low band government frequency of 39.10 MHz, most sites will continue to repeat traffic on that channel until those users are transitioned to the new network.

The cost of the system has grown from \$22 million to \$31 million, in part to provide more complete coverage found necessary after initial testing. For instance, Minnehaha County, located in the southeast corner of the state, was supposed to be able to get by with two repeater sites. It appears now that the county needs five sites in order to provide solid coverage inside buildings and basements. Out on the western side of the state the hilly geography is causing some counties there to take a closer look at their coverage and make requests for additional repeater towers.

The additional \$9 million dollars is coming from Homeland Security funds and other grants from the federal government that will help cover these additional costs.

Unlike some other states, South Dakota provides free access to the network and has provided free radios to nearly all local public safety radio users. The network will be maintained by the state, including the towers and repeater equipment. The users are responsible for maintenance and repair of their own radio equipment. This type of arrangement is expected save local users the on-going mainte-



inance costs of operating their own network, which on a statewide basis could be as much as \$10 million.

Federal agencies are also making use of the system, including the Departments of Interior and Justice. Future federal users are expected to include the Bureaus of Indian Affairs, Bureau of Land Management, National Park Service, the U.S. Marshals and the Department of Energy.

Because all radio traffic is expected to be carried by this network, the various agencies will have the ability to interoperate – they can communicate directly with each other rather than having to relay messages between incompatible radio systems. For instance, police, fire and emergency medical services can all be coordinated from a single dispatch center rather than from three different locations.

With so many repeater sites and frequencies for this system, it would be easier to go to my web site at <http://www.signalharbor.com> and look up specific county information there. In the meantime, nearly every repeater has the frequency 155.475 MHz and most sites have 156.015 MHz, so you could try checking those.

The talkgroup 4784 (hex 12B) is a statewide fire group. The Highway Patrol in the Sioux Falls area use talkgroups 3824 (hex 0EF) and 3920 (hex 0F5) for car-to-car communication. The Custer County Sheriff uses talkgroup 20592 (hex 507). More talkgroup information is welcome!

◆ Glendale, Arizona

The city of Glendale, a suburb of Phoenix, is the first municipality in Arizona to go fully digital. Their new \$9 million radio system was turned on in December, replacing a 15-year-old analog system that officials said had inadequate coverage and poor voice quality. Glendale is the 4th largest city in Arizona with more than 230,000 residents.

The new system is provided by Motorola and uses the APCO Project 25 standard; you will need one of the new digital scanners in order to monitor the system. Nearby jurisdictions, like Phoenix and Mesa, have radio systems with a mix of analog and digital traffic.

The main users of the system are the police and fire services.

The Glendale Police Department has more than 350 officers. Besides the standard dispatch traffic you may hear references to "Shot Spotter." This is an automated system that determines the location of random gunfire in specific areas of the city. Audio sensors triangulate the location of the sound to within 25 feet and report that location back to the dispatch center. More than 200 instances of gunfire were identified in 2002. Not all traffic will come across the radio, however, since every patrol car is now equipped with a mobile data computer.

Glendale has seven fire stations, numbered 51 to 58. Most of their call-outs are for emergency medical service, but they also respond to several thousand fire calls each year.

The FCC database reports two repeater sites, one on 19th Avenue and the other off Glen Harbor Boulevard by the airport. The eight frequencies in use are 856.4375, 856.7125,

857.4375, 857.7125, 858.4375, 858.7125, 859.4375, 859.7125, 860.4375 and 860.7125 MHz.

DEC	HEX	Description
301	12D	Police A (Patrol)
303	12F	Police B
305	131	Police C
307	133	Police D (Car to Car)
309	135	Police E
311	137	Police F
503	1F7	Utilities
507	1FB	Streets and Signals
513	201	Sanitation

48176	BC3	Fire Prevention
48208	BC5	County Fire 1 (patch to 154.310 MHz)
48240	BC7	County Fire 2 (patch to 154.355 MHz)
48272	BC9	Patch to 154.355
49616	C1D	Beach All Talk Groups
49648	C1F	Beach Patrol Dispatch
49680	C21	Beach Patrol Tactical
49712	C23	Marine Channel (patch to 156.800 MHz)
49744	C25	Atlantic County Police Department (patch to 156.210 MHz)
51216	C81	Emergency All Talk Groups
51248	C83	Emergency Ops 1
51280	C85	Emergency Ops 2
51312	C87	Emergency Ops Tactical
51344	C89	Emergency Administration

Digital Talkgroups

DEC	HEX	Description
16	001	Police All Talk Group
48	003	Police Dispatch
80	005	Administration
112	007	Investigations
144	009	Scene Tactical 1
176	00B	Scene Tactical 2

◆ San Diego County, California

The fires from last fall in southern California are having a fall-out effect on the perception of the performance of San Diego County's radio system. Personnel fighting the October wildfires complained repeatedly about gaps in coverage and lack of capacity. In addition, assistance from outside the county had difficulty providing mutual aid because of radio incompatibilities.

The San Diego/Imperial County Regional Communications System is a Motorola 800 MHz trunked radio network serving nearly 200 agencies through 11 dispatch centers. It came on-line in 1998 at a cost of more than \$40 million and currently provides service for more than 16,000 mobile and portable radios. It covers almost 9,000 square miles of varied terrain, everything from valleys below sea level to hills of more than 6,500 feet.

One of the primary goals of the system was to provide interoperability between local, state and federal agencies in situations exactly like the recent fires. However, many state and federal public safety departments are not yet part of the system and therefore have difficulty communicating on short notice.

The system has 18 repeaters operating as two simulcast zones (north and south) along with 29 stand-alone repeaters. Together these repeaters make use of more than 150 frequency pairs. Despite such a large number of frequencies, fires in 2001 and 2002 resulted in overloads when large numbers of firefighters tried to use the system.

As a result of these problems, the performance of the system is under review and recommendations are expected that can improve coverage and capacity.

That's all I have for this month. More information on these and other topics are available on my web site at <http://www.signalharbor.com>. I welcome your questions, comments and frequency lists via electronic mail to danveeneman@monitoringtimes.com. Until next time, happy scanning!

◆ Atlantic City, New Jersey

Police and fire radios in Atlantic City, New Jersey, are apparently not working as well as local officials had hoped. The city uses a Motorola 800 MHz system for public safety that was installed a couple of years ago at a cost of more than \$2 million. An investigation is underway after some well-publicized failures, including a recent fire at the Tropicana. Apparently the system works well out in the open but has problems in buildings, and especially inside some of the larger casinos.

As with Washington, D.C. and other cities, one suggestion was to install signal repeaters on emergency vehicles in order to provide better in-building coverage.

Atlantic City switched from an old UHF/VHF system to 800 MHz in 2002. The current system has both analog and digital APCO 25 voice traffic on the following frequencies: 853.3625, 856.7625, 857.7625, 858.7625, 859.7625, 860.4375 and 860.7625 MHz.

Analog Talkgroups

DEC	HEX	Description
48016	BB9	Fire All Talk Groups
48048	BBB	Fire Dispatch
48080	BBD	Fireground 2
48112	BBF	Fireground 3
48144	BC1	Administration

Scanning the Railhead

The Orangeville and Brampton Railway



OBRY locomotive - The Pride of Orangeville

About seventy five kilometers northwest of the City of Toronto, the Queen's highway encounters a steep upward gradient. At this point the lowlands surrounding the city give way to the highlands of the Niagara Escarpment. The Niagara Escarpment is a World Biosphere Reserve and stretches 725 kilometers from Niagara Falls in southwest Ontario up to Tobermory on the Bruce Peninsula.

The road from Toronto heads up toward what is called "Headwaters Country" (several rivers find their origins in this area). It passes through the City of Mississauga, home of Canada's oldest mayor (the octogenarian "Hurricane" Hazel McCallion), then on through the City of Brampton and up the escarpment into the Towns of Caledon and Orangeville.

It is a very pleasant drive that takes travelers past scenic pleasures such as the "Devil's Pulpit." Actually there are two Devil's Pulpits. On the west side of the road lies the steep slope of the hill bearing that name, while on the east side lies the exclusive and private Devil's Pulpit golf club.

Running roughly parallel to the road is one of Canada's smallest independent railroads – the Orangeville and Brampton Railway (OBRY). This line is quite different to the many steam preservation society private lines to be found all across Canada. The OBRY is a live, working freight line with diesel locomotives, but not a single passenger car is to be found in its inventory of rolling stock. The line was formerly the Owen Sound subdivision of the CPR (Canadian Pacific Railway) until the Town of Orangeville purchased a 55 km stretch of the line that connects it with the CPR tracks in Mississauga.

The OBRY line is managed by the Orangeville Railway Development Corporation (ORDC) and serves a number of local industries through the Orangeville-Brampton Rail Access Group (OBrag). OBrag members include Geon Canada Inc., The Clorox Co. of Canada Ltd., Symplastics Ltd., Performance Packaging Inc., Vulsay Ltd., and Holmes Agro Ltd. The line is operated by a Manitoba-based company called Cando Contracting Ltd (Cando) on Tuesdays and Thursdays when it delivers resource materials to OBrag members.

Scanning Canada is going to ride the rails to monitor the frequencies to be found alongside this short, but very scenic rail corridor. This month we start at the top of the line in Orangeville.

A search has not turned up any frequencies for the members of OBrag except Clorox which can be found on 451.1875 and 464.6875 MHz. The following railway frequencies are licensed

to Cando Contracting in Ontario: 151.055 160.665 160.935 160.965 161.115 161.415 and should reveal traffic on the line every Tuesday and Thursday!

The Orangeville area is an interesting target territory for its large community of scanner owners. rooftops in the town reveal a larger than average number of scanning antennas. One home has four ground plane antennas and one discone on the roof. (If this is your home, we have to meet!)

Frequencies in the Orangeville Area

Emergency Services:

Province of Ontario (GMCO)

149.440 152.000 411.7375 419.4125

Town of Orangeville Police

142.830 (verified as still non-trunked analog)

Dufferin-Caledon Healthcare Corp

(Orangeville Hospital and Air Ambulance)

31.420 153.275 460.6875 465.8125

467.7750 467.8500 467.8750 467.9000

Town of Erin Fire and Emergency Services

141.330 150.100 153.770 154.070

154.130 154.160 158.640

Town of Orangeville Fire Department

148.655 151.385 154.070 154.130

154.370 154.800 158.955

Township of Adjala-Tosoronto Fire Department

158.235

Municipal Services:

(good monitoring during winter road maintenance):

Town of Orangeville Works Department

154.445 154.555

Township of Amaranth

159.120 163.860

Dufferin County Roads Dept, Township of East

Garafraza,

Township of Mono Roads Dept 163.860

Township of Adjala-Tosoronto

Roads Department 165.705

Town of Caledon

Roads Department 169.155 169.755

Regional Municipality of Peel

952.84375

Utilities:

Note that the old Ontario Hydro microwave repeater system has been dismantled, but at least two of the abandoned repeater stations remain in the Orangeville area.

Hydro One Networks Inc

49.170 72.420

Orangeville Hydro Limited

168.105

Ontario Power Generation Inc.

172.725 416.1375

Enbridge Gas Distribution Inc.

(Large transmitter tower in Orangeville)

451.8125 452.6375 452.9750 454.6375

456.8125 460.0125 464.1625 464.3125

943.4250

Schools:

Laidlaw Transit Ltd (School Buses)

167.415

Upper Grand District School Board

464.7375 464.9375

Recreation:

Hockley Valley Resort (Skiing/Golf)

172.980

Town of Orangeville Tony Rose

Sports Centre (Hockey) 151.085

Tim Horton Donuts (Drive-thru)

30.580000 464.0125

Kentucky Fried Chicken (Drive-thru)

30.840000

Amateur Radio Repeaters:

VE3MAP 444.500/224.760, VE3ORX

444.025, VE3DRC 442.925

Next month our rail trip moves down the line as we follow the tracks down the Caledon Mountain past waterfalls and hairpin bends in the road, to the base of the Niagara Escarpment and into the Greater Toronto Area.

❖ Two Great Countries Divided by Two Megahertz

When two large nations like Canada and the United States share a common border, there will inevitably be situations in which the different radio regulations do not resolve a potential user conflict when it comes to frequency allocation. This column has discussed cross-border cooperation in recent months. This month we revisit the issue to discuss how Canada and the United States have resolved the different allocations for the 220-222 MHz sub-band.

In the United States, these frequencies are allocated to fixed and mobile services, while in Canada it is exclusively allocated to amateur radio use. Representatives of the two countries met as recently as 1999 to hammer out a policy for cooperation. The result is a rather convoluted and complex regulation affecting use of frequencies between 220 and 222 MHz. The intent is to avoid interference in the sub-band by restriction power levels and antenna heights in the border region.

The Canadian 220-225 MHz band is not particularly popular with hams and, in Ontario at least, repeaters are all near the top end of the band. So, if you are monitoring between 220 and 222 MHz, unless you hear ham callsigns being exchanged, you are probably hearing a cross-border transmission from a US station. *Scanning Canada* thanks reader Jerry None for prompting a discussion of this topic.

Hugh Stegman

hughstegman@monitoringtimes.com
www.ominous-valve.com/uteworld.html

Oceanic Radiolocation: Weird Things Afloat

Some of the most mysterious noises on the radio come from the various locator devices used at sea. These tend to congregate on the low and high ends of the typical "short wave" radio dial. Let's look at a few:

◆ Medium-Wave Radionavigation

Radionavigation is defined as radiolocation (radar, to oversimplify slightly), and radiodetermination, which includes passive receivers obtaining positions with directional or phase information from fixed radio beacons. For medium-frequency (MF, 300 to 3000 kilohertz), we're talking mostly about the second case.

After LORAN (Long Range Navigation) departed 1800-2000 kilohertz (kHz) in the early '60s, this and surrounding spectrum saw newer systems like Sea-Fix, HydroTrac, Hi-Fix, and finally HyperFix. "HyperFix" refers to the "hyperbolic" grid formed by intersecting groundwaves from a "master" transmitter and a number of phased "slaves." It's very accurate, but of course it's rapidly losing out to the satellite-based Global Positioning System (GPS).

Until fairly recently, Hyperfix was offered by Racal on contract to offshore oil platform operators. This part of Racal, though, is now Thales Geosystems, and it's converting to differential GPS (DGPS). DGPS uses the precisely known position of a terrestrial receiver (the reference) to generate corrections in the user's DGPS-capable receiver (the rover). This improves accuracy to 1-2 meters, or even better. In the Thales version, called DeltaFix, MF radio beacons at the receive sites pass binary data over dedicated, two-frequency, diversity pairs.

DeltaFix beacons can sound a bit like teleprinting, although they are not. Remaining Hyperfix beacons repeat groups of continuous-wave beeps that are often mistaken for Morse code. The enhanced mode (Hy-Link) transmits additional information or even DGPS corrections in something sounding like frequency-shift keying.

Meanwhile, listeners all over the United States often pick up a "mystery" single-tone modem, with the distinctive short bursts of "packet radio" or the similar modes used by aircraft. A new one is on 1775.5 kHz, though others have been

heard for years, all over North America. Whoever knows what they are is not talking.

◆ Fish Net Beacons

Other mysterious-sounding signals come from the radio buoys used on long fishlines or drift nets. A long line is a buoyed wire many miles long, with hanging hooks. It's come into favor as a means of discouraging the indiscriminate use of drift nets, which are also miles long and do greater harm to the environment.

Either setup is deployed and left to the winds and currents for a certain amount of time, then located again by use of standard radio direction finding (DF) gear. Lost equipment and catch is disastrous for the boat, not to mention the millions of sea creatures unnecessarily killed by long-lost "ghost" nets. These drift until full, then sink.

Any drifting fishing gear must therefore be marked by radio buoys. These are made mostly in Asia. They consist basically of a float weighted down by a watertight canister with batteries and electronics, topped by a waterproof whip antenna for medium-frequency or high-frequency (HF, 3 to 30 megahertz).

The simplest buoys endlessly repeat a 4-character Morse code identifier, using 8-10 watts in straight CW (continuous wave). Others transmit four minutes on and four off, to save batteries. Occasionally, Cyrillic Morse characters are heard, indicating Russian ownership.

These things can have a surprising range over salt water. Seagoing poachers were starting to DF buoys that weren't theirs, stealing the catch and equipment. Therefore, newer buoys use selective calling, known as "sel-call" in that industry. They listen before they squawk. The transmitters keep quiet until a special transmitter sends a field-programmed, encrypted code to turn them on.

Needless to say, we're also starting to see GPS receivers in these, too. They don't need DF'ing, because they broadcast their position, again using encryption. Signals sound nothing like Morse, but more like data telemetry.

Classically, these have always used the same



radiolocation frequencies mentioned above. One manufacturer lists the following carrier frequencies (all kHz): 1715, 1981, 1985, 1989, 1735, 1982, 1986, 1755, 1983, 1987, 1775, 1984, and 1988.

However, there is another type of buoy, again mostly Asian, which is more likely to use frequencies above 28 megahertz, perhaps as high as 32 MHz. Most, though, seem to be right in the CW end of the 10-meter amateur band, from 28000 up to maybe 28420 kHz. Many send shorter Morse strings, and are mistaken for Russian single-letter markers or amateur propagation beacons.

These, too, can get out nicely over water, but also there's the skip problem when solar conditions allow. A few watts is plenty for global coverage with 10 meter skip, and these signals turn up regularly in the US, Australian, Japanese and European amateur bands, where they get written up as intruders by the ever-vigilant hams. Strange place, 10 meters.

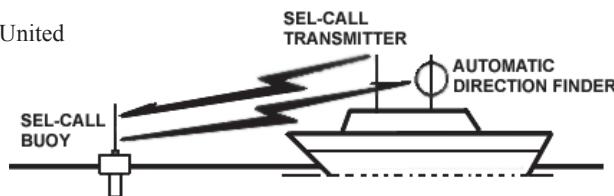
◆ Correction Time!

One good thing about this column is how knowledgeable its readers are. When they spot mistakes, we all learn.

John Klos has written to say, quite correctly, that the "Big A" airline callsign mentioned in the November 2003 column is Arrow Air, a cargo-oriented carrier with scheduled freighters to New York, Miami, Central America, and South America. Their planes do indeed have a big "A" on their tails. It is not a military charter and has nothing to do with Kalitta-AIA (American International Airways), another freight line. A bit of a red face here, since of course it's correct in my own callsign file!

Ken, N4SO, wants to correct a frequency that appeared in the September 2003 Utility Logs. It was shown as 23523.0 kHz, for weather FAX from JMH, Tokyo, Japan. The licensed frequency is actually 23522.9. Of course, frequencies in the logs are provided by the person making the logging. While it's nice to hit the exact channel center, there are so many differences in radios, computers, off-frequency transmitters, and pesonal ears that differences of a tenth or so on FAX and digital modes are typically left unchanged. As usual in HF, your mileage will vary.

Keep finding good stuff, and see you next month.



ABBREVIATIONS USED IN THIS COLUMN

AFB	Air Force Base
ALE	Automatic Link Establishment
AM	Amplitude Modulation
ARQ	Automatic Repeat Request teleprinting system
CAMSLANT	Communication Area Master Station, Atlantic
CAMSPAC	Communication Area Master Station, Pacific
Coq-8	Coquelet, French teleprinting system
CW	Morse code telegraphy ("Continuous Wave")
DEA	US Drug Enforcement Administration
E3	British "Lincolnshire Poacher," Cyprus
EAM	Emergency Action Message
EOC	Emergency Operations Center
FACSFAC	Fleet Area Control and Surveillance Facility
FAX	Radiofacsimile
FEC	Forward Error Correction teleprinting system
FEMA	US Federal Emergency Management Agency
HF-GCS	High-Frequency Global Communications System
JSTARS	Joint Surveillance Target Attack Radar System
LDOC	Long-Distance Operational Control
LSB	Lower Sideband
MARS	Military Affiliate Radio System
Meteo	Meteorological
MFA	Ministry of Foreign Affairs
NORAD	North American Aerospace Defense Command
PACTOR	Packet Teleprinting Over Radio
PR	Puerto Rico
RSA	Republic of South Africa
RTTY	Radio Teletype
SAM	Special Air Mission (Distinguished Visitors)
SITOR-A	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B	Simplex Teleprinting Over Radio, FEC mode
TISCOM	Telecom & Information System Command
UK	United Kingdom
Unid	Unidentified
US	United States
USS	United States Ship

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations (encrypted, usually unidentified, broadcasts thought to be intelligence-related) are identified in () with their ENIGMA station designators, as issued by the European Numbers Intelligence Gathering and Monitoring Association.

301.0 "TH"-CW non-directional navigation beacon, Villacoublay Military Airport, France, at 2130. (Patrice Privat-France)
 1677.0 OFK-Turku Radio, Finland, safety warnings in English and Finnish, at 2230. (Privat-France)
 2252.0 "Y-4-Q"-US Navy, calling Giant Killer (FACSFAC, VA), at 2356. (Rick Baker-OH)
 4014.0 ZRH-South African Navy, Silvermine, FAX weather chart at 1038. (Bob Hall-RSA)
 4213.7 IDR2-Italian Navy, Rome, RTTY channel availability marker and marine safety warnings at 2128. (Hall-RSA)
 4363.0 3AC-Monaco Radio, calling vessel FT2798, at 1959. (Privat-France)
 4372.0 "N-6-V"-US Navy Link-16 coordination net with "E-2-W" and "U-7-S," at 0045. (Mark Cleary-SC) [Improved version of Link-11 with greater throughput. -Hugh]
 4408.5 Unid-Possible French Navy, testing at 1955. (Privat-France)
 4449.9 FDI8-French Air Force, Nice, CW marker at 1601. (Day Watson-UK)
 4469.0 Southeast Region-Civil Air Patrol, calling Mockingbird 4 and 7, at 0100. (Perron-MD)
 4555.2 DLVY-German Customs, vessel Hamburg ZB, calling Cuxhaven in SITOR-A, at 0745. (Privat-France)
 4718.0 Kinloss Rescue-Air Rescue Coordination Center, Scotland, came from 5680 for Rescue 131, at 2309. (Baker-OH)
 4721.0 Reach 1193-US Air Force Air Mobility Command, ALE-initiated patch to Hilda Meteo, (Scott AFB, IL), at 0147. (Cleary-SC)

4724.0 Offutt-US Air Force, Offutt AFB, NE, with a 28-character EAM, simulcast on 6739, 8992, 11175, and 11244, at 2215, again at 2218. Sigonella-US Air Force, Italy, with a 28-character EAM at 2230. Offutt, 22-character EAM, also 6739, 8992, 11175, and 11244, at 2233. Offutt, with Skyking broadcast, also 11175, at 2256. (Steve O'Connor-NJ)
 4739.0 Tally 711-US Air Force, went to secure voice for "Salinas" (probably HF-GCS, PR), at 0046. (Baker-OH)
 5367.0 FDI8-French Air Force, Nice, RTTY "voyez le brick" test loop at 1045. (Privat-France)
 5680.0 Kinloss Rescue-Air Rescue Coordination Center, Scotland, working Rescue 137 at 2306. (Baker-OH)
 5696.0 CAMSLANT, working "D-4-F" at 2231. (O'Connor-NJ) Rescue 2131-US Coast Guard, working CAMSLANT in a search, at 2343 (Baker-OH)
 5708.0 Reach 631-US Air Force Air Mobility Command, ALE-initiated call to Scott AFB, IL, for a patch to Dover AFB, at 2258. (Cleary-SC)
 5717.0 Halifax Military-Canadian Forces, setting radio guard with Rescue 306, secondary 6694, at 0105. (Baker-OH)
 5732.0 Service Center-US Customs, diverting 15C to a sinking vessel, at 0022. (Cleary-SC)
 6249.5 Golf Whiskey-US Navy, probably the USS George Washington battle group training in the Atlantic, working Golf Bravo at 2317. (Baker-OH)
 6348.0 FUE-French Navy Brest, testing in RTTY at 1329. (Watson-UK)
 6496.0 CFH-Canadian Forces, Halifax, NS, weather in RTTY, simulkeyed on 10536, at 2149. (Hall-RSA)
 6697.0 Sea Spray-US military, with a 28-character EAM, simulcast on 8992 and 11244, at 1934. (Jeff Haverlah-TX)
 6761.0 Gasser 40-US Air Force tanker, working Kansas 69 at 0013. (Baker-OH)
 6800.0 6138-Possible Turkish intelligence, sounding in ALE at 1734. (Watson-UK)
 6833.0 Unknown-US military, EAM from station with uncopyable trigraph identifier, on old US Navy Hicom (High Command) frequency, at 2258. (Haverlah-TX)
 6834.0 GYA-UK Royal Navy, Northwood, with out-of-sync weather FAX for the middle east, at 1856. (Watson-UK)
 6900.0 LECAIRE-French Embassy, Cairo, Egypt, working CER41, Paris MFA, in ALE at 1820 and 1825. (Watson-UK)
 7527.0 Omaha 670-US Customs Service, working Service Center and Hammer (March ARB, CA), at 1418. (Cleary-SC)
 7535.0 Norfolk SESEF-US Navy Ship Electronic Systems Evaluation Facility, VA, testing with USS Trenton at 1314. Norfolk SESEF, working the new USS Ronald Reagan (CVN-76), at 1427. (Baker-OH)
 7633.0 Army Base-Unknown military, testing a data mode with Army Air on "channel 4," at 1815. (Perron-MD)
 7635.0 Head CAP 45-Civil Air Patrol National Chaplains Net, working Head CAP 49, then giving daily devotional message, at 2200. (Perron-MD)
 7646.0 DDH7-Hamburg Meteo, Germany, with RTTY weather and bulletins at 1012. (Watson-UK)
 7740.0 AMMAN-French Embassy, Amman, Jordan, calling Abu Dhabi in ALE at 1734. AMMAN, calling CER41, Paris, ALE at 1808. (Watson-UK)
 8060.0 PAR-Rockwell-Collins, Paris, France, sounding in ALE at 1653. (Watson-UK)
 8298.0 VTP-Indian Navy, Vishakhapatnam, weather in RTTY at 2220. (Hall-RSA)
 8475.0 RFVIE-French Navy, Le Port, RTTY test loop at 2153. (Hall-RSA)
 8511.7 DAO-Kiel Radio, Germany, CW identifier in 3-tone PACTOR-III markers on a private KielMail channel, company web site lists channel center of 8511.9, at 1100. (Watson-UK)
 8582.0 PWZ33-Brazil Navy, Rio de Janeiro, poor copy on RTTY weather and news in English, at 2130. (Watson-UK)
 8731.0 KLB-Seattle Radio, WA, weather, simulcast on 8806 by WLO, at 0003. (Baker-OH)
 8740.0 SVO-Olympia Radio, Greece, working a vessel then back to marker, at 0152. (Baker-OH)
 8743.0 SVW42-Olympia Radio, Greece, voice synthesized traffic list at 2350. (Baker-OH)

8912.0 Foxtrot 12, working CAMSPAC and Service Center, at 2218. (Cleary-SC)

8971.0 Trident 42-US Navy, working Goldenhawk (Brunswick, ME) and Trident 21, at 0004. (Cleary-SC)

8983.0 Coast Guard 1503-US Coast Guard aircraft in Ecuador, working CAMSLANT at 0011. (Cleary-SC)

8992.0 Navy PJ 642-US Navy, patch via McClellan HF-GCS to Whidbey Island, WA, at 1202. Havoc 26-US Air Force, patch via McClellan for weather at Guantanamo Bay, at 1214. Leg 21-US P-3C, ops-normal patch via Andrews HF-GCS to Joint Inter-agency Task Force-South, at 2347. (Cleary-SC)

9025.0 CICLON-Mexican Army ("Cyclone"), calling HURACAN ("Hurricane"), in ALE at 0317. AED-US Air Force, Edwards AFB, CA, calling HIK, Hickam AFB, HI, at 1206. HURACAN calling CENTELLA ("Sparkles"), ALE at 1216. (Perron-MD) Foxtrot 40-Probably US Coast Guard, making ALE-initiated patch to Cape Cod Air after being diverted to a search-and-rescue, at 2226. (Cleary-SC)

9031.0 Ascot 836-UK Royal Air Force, working Architect (RAF Flight Watch), at 0900. (Privat-France)

9120.0 Navy 511-US Navy, patch via Andrews HF-GCS at 2114. (Cleary-SC)

9227.0 AAA-Israeli Air Force headquarters, sounding in ALE, then on 10614, both at 1328. (Watson-UK)

9987.3 Unid-Station calling F52HAC in PACTOR-I, at 1533. (Watson-UK)

10242.0 Coast Guard 1502-US Coast Guard, enroute to Ecuador, working Service Center at 2131. Coast Guard 1503, responding to distressed fishing vessel Atlanta, working CAMSPAC at 2227. (Cleary-SC)

10493.0 WGY 908-FEMA Region 8 and alternate net control, Denver, CO, simulcasting on 5211 LSB, working a MARS station in LSB, at 0030. (Hugh Stegman-CA)

10900.0 T8N-Unknown Moroccan station, working T2P in ALE, then calling K6T at 1205, 1327, and 1331. (Watson-UK)

11053.5 Golf Bravo-US Navy, net control with Golf Whiskey in the George Washington battle group training, at 0005. (Baker-OH)

11175.0 Base Run-US military, patch via Offutt to "Maintenance," at 2137. (Haverlah-TX) Reach 2018-US Air Force Air Mobility Command, calling Mainsail, raising Andrews for a radio check at 2221. (O'Connor-NJ) Turbo 16-US Air Force Reserve tanker, working HF-GCS Puerto Rico for an exercise message at 2337. (Baker-OH)

11220.0 Andrews-US Air Force, calling SAM 6638, a distinguished visitor flight, at 2210. (Cleary-SC)

11232.0 Sentry 06-US Air Force Airborne Warning And Control System aircraft, patch via Trenton Military to Tinker AFB, OK, followed by Sentry 42 and Sentry 52, also AWACS, all starting at 1936. (Cleary-SC) Shado 64-US Air Force C-130, patch via Trenton to Kirtland AFB Meteo, at 2130. (Perron-MD)

11244.0 Offutt-US Air Force HF-GCS, NE, garbled messages to "all stations," then finally, "Emergency station securing operations, time 14[unintelligible]" at 1414. Fireship-US Strategic Command, three EAMs also on 8992 and 13155, and one minute of music, at 1617. Glassware-US military, kicking Sled Dog to Z320 (24828? nothing heard), and later Z280 (18387, nothing heard), starting at 2037. Clemency, relaying 4-character messages from stations with uncopyable calls to Skymaster, at 2255. (Haverlah-TX) [All this weirdness sounds like the annual fall exercise. -Hugh]

11250.0 Halifax Military-Canadian Forces, giving weather info to unheard aircraft at 1726. (Perron-MD)

11491.0 OC1-US Federal Bureau of Investigation, working DL1 (Dallas), in ALE at 1121. (Watson-UK)

11492.0 6138-Possible Turkish intelligence, ALE sounding at 1237, 1338, and 1438. (Watson-UK)

11494.0 Coast Guard 1503-US Coast Guard, patch via Service Center (US Customs) to Lantarea Command regarding distressed fishing vessel Atlanta, at 0115. (Cleary-SC)

11494.0 CS9-US Customs Service, possibly SC, ALE sounding at 0715, 0845, and 0930. (Privat-France)

12170.0 LECAIRE-French Embassy, Cairo, Egypt, calling Khartoum in ALE, at 1007. AMMAN-French Embassy, Amman, Jordan, working CER41, Paris MFA, in ALE at 1439. (Watson-UK)

12603.0 Lincolnshire Poacher-British intelligence "numbers" (E3), jingle and callup "14364," strong signal at 1805. (Privat-France)

12710.5 PWZ-Brazilian Navy, Rio de Janeiro, warnings and weather in Portuguese and fast RTTY (200/850), at 0420. (Hall-RSA)

12903.0 VTP1/5/7-Indian Navy, Bombay, RTTY test loop at 1626. (Hall-RSA)

13089.0 CAMSLANT-US Coast Guard, VA, radio checks with Cutter Biscayne Bay, at 2157. (Cleary-SC) CAMSPAC Point Reyes-US Coast Guard, CA, "Perfect Paul" synthesized weather voice at 2327. (Baker-OH)

13155.0 Geranium-US military, strange time-stamped message (not an EAM?), also on 8992 and 11244, at 0415. (Haverlah-TX)

13200.0 Evac 50237-US Air Force, patch via Puerto Rico HF-GCS to Andrews, at 0143. (Cleary-SC)

13257.0 Canforce 2211-Canadian Forces, working Trenton Military for weather, at 1745. (Cleary-SC)

13291.0 Gander-North Atlantic air route control, Canada, working Reach 698, a US Air Force C-5A, at 1438. (Perron-MD)

13330.0 Houston-Probably Houston Universal LDOC, working Big A 574 enroute to El Salvador, at 2214 (Perron-MD)

13370.0 GUY-UK Royal Navy, Gibraltar, RTTY test loop at 1635. (Watson-UK)

13375.0 Lincolnshire Poacher-British MI6/SIS "numbers" (E3), jingle and callup 59564, at 1705. (Privat-France)

13886.0 Unid-Moscow Meteo, clear FAX weather chart at 1615. (Hall-RSA)

13927.0 RAZOR 33-US Air Force E-8C JSTARS, patch via Air Force MARS station AFA3HS to Peachtree, Robins AFB, GA, at 1544. Corso 76-PR Air National Guard C-130, patch via Air Force MARS to Shaw AFB meteo, at 2255. (Cleary-SC)

14422.0 MAE-Algerian MFA, Algiers, calling GAO, Garoua, then passing a command string in ALE, at 1643. (Watson-UK)

14780.0 ERMRIO-Brazilian Navy, Rio de Janeiro, calling FBOSIS (Frigate Bosisio), also on 12370 and 15932, at 0118. (Perron-MD)

14842.0 PWZ33-Brazilian Navy, Rio de Janeiro, very slow PACTOR traffic in Portuguese, at 0940. (Hall-RSA)

16806.5 L2C-Argentine Coast Guard, Buenos Aires, SITOR-B marine safety warnings in Spanish, at 1000. (Hall-RSA)

16976.0 PWZ33-Brazilian Navy, Rio de Janeiro, RTTY marine safety warnings in English, at 0500. (Hall-RSA)

16984.0 PWZ33-Brazilian Navy, Rio de Janeiro, very slow PACTOR traffic in Portuguese, at 1805. (Hall-RSA)

17940.0 Iberia Operations-Iberia Airlines LDOC, working a flight in Spanish at 1733. Houston Radio-LDOC, working "3378" at 1738. (Perron-MD)

17988.0 NMC-US Coast Guard CAMSPAC, Pt. Reyes, CA, sounding in ALE at 1959. TISCOM-US Coast Guard, VA, sounding in ALE at 2001. (Perron-MD)

18223.7 kdakrfh-Egyptian MFA, Cairo, ARQ message in Arabic to many embassies, at 1640. (Hall-RSA)

18571.7 Unid-Tunis diplomatic, Tunisia, SITOR-B operator chatter and 5-letter code groups at 2031. (Hall-RSA)

19036.4 Unid-Algerian MFA, Algiers, exchanging Coq-8 messages with Dakar, Senegal, at 1003. (Watson-UK)

19066.7 Unid-Egyptian diplomatic, location unknown, poor copy on Arabic SITOR-A traffic at 1525. (Watson-UK)

19103.5 001-Probably US Navy, PR, sounding in ALE at 1435 and 1801. (Perron-MD)

19414.7 Unid-Egyptian MFA, Cairo, ARQ message to unknown station in Arabic, at 1619. (Hall-RSA)

20400.0 LLANOS-Venezuelan Navy vessel Los Llanos, calling vessel Capana in LSB ALE, at 1613. (Perron-MD)

21866.0 TX6-FEMA Texas State EOC, Austin, calling NM6, New Mexico EOC, in ALE at 1703. (Perron-MD)

23150.3 WPC-Sailmail, NJ, identifying in CW every 3 minutes during PACTOR-III markers, at 1448. (Watson-UK)

Receiver Matters

Prompted by a few letters to *Digital Digest* over the past few months, we turn our attention to the radios we use to listen to digital utility stations.

◆ Which Receiver's Best?

A letter from StormChaser in Alabama asks "Dear Mike, I am constantly intrigued by the amazing stations reported in *Monitoring Times*. In fact, I've finally resolved to spend my pennies for a receiver to start listening myself. There seem to be a lot of receivers to choose from and I'm bewildered by features like IF Shift, BWC, DSP and memories. What advice can you give for someone with a modest budget?"

StormChaser is quite correct in that today's receivers do seem to have an incredible array of wonderful features; many, as she/he points out, have very technical-sounding names. How can we unravel all of this and arrive at a good choice?

First, let's discount most scanners and consumer broadcast-oriented radios as unsuitable. Scanners, even wide band expensive models with HF coverage such as Yaesu's VR5000, do a relatively poor job at HF and are not well suited to the demands of digital utility listening. As in life, there is always an exception to the rule and in this case the Icom ICR8500 does a very good job at HF and VHF/UHF frequencies. Consumer models like Grundig's Yacht Boy series, while excellent for AM broadcast listening on the shortwave bands, are also generally poor for serious HF digital work.

For the time being, let's lay aside all of the amazing features that are made possible by today's microprocessor technology — DSP, memories, scanning, dual watch, priority channels, etc. Many are luxuries that we can often do without and which may indeed distract us from some more important features that tell us much about the basic performance of the radio.

Let's look at the four "S's" — sensitivity, selectivity, stability, steps — all of which are important in choosing a receiver for digital utility listening and which can usually be found by consulting the receiver's detailed specifications.

Sensitivity

The first "S", sensitivity, is the measure of a receiver's ability to hear weak signals. Sensitivity used to be very important in times gone by, but now practically any modern HF receiver (once we've discounted those broadcast and wideband models mentioned earlier) has sufficient sensitivity for digital utility listening and this measure can therefore generally be counted upon to be fine for our purposes.

Selectivity

Our second "S", selectivity, is the measure of a receiver's ability to discriminate between

two signals that are close together in frequency. We frequently have to deal with this problem in listening to HF utility stations and need to isolate a single signal from other interfering or close-by transmissions. If the radio under consideration has a single filter, look for one with a final IF bandwidth of 2.4 kHz or less. Such a filter is wide enough to pass most high-speed digital signals like MIL-STD-188-110A and STANAG4285 and comfortable enough for voice listening while being narrow enough to decode most other systems when not close to other signals.

More expensive receivers will offer a selection of smaller bandwidth filters, as standard or as an option. Top-of-the-range radios will have either infinitely variable filters (like JRC's NRD545, which calls this feature BWC or Band Width Control) or offer a wide range of filter widths (like the WJ HF1000, Ten Tec RX340). If a selection of filters is available, a narrowest filter of 500 Hz width is ideal for listening to most narrow band signals like SITOR, PacTOR and CW.

Stability

Our third "S", stability, is a measure of a receiver's ability to stay tuned accurately to the frequency of choosing and not drift as components warm-up or as external temperatures change. As with sensitivity, during the days of tube technology and in the early days of transistors, stability was a significant problem. Even today, the problem with many cheaper receivers is that they will drift appreciably and often move an accurately tuned signal out of the decoder's center frequency, rendering it unintelligible.

Look for receivers with a few parts per million (ppm) stability — the lower the better. Nowadays, a TCXO (Temperature Controlled Crystal Oscillator) is also a relatively inexpensive option for keeping a receiver rock-solid on frequency.

Steps

Finally, look for a receiver with minimum tuning steps of 50Hz or smaller. Any larger steps, if accompanied by an adjustable BFO (sometimes called a clarifier) is a good second-best. Tuning stuff accurately with anything less than this specification is a pain.

So, what do we find if we examine our choices among dedicated HF receivers that fit our first-pass criteria?

Icom R75	\$550
AOR7030	\$1,500
Drake R8B	\$1,500
Icom R8500	\$1,450
JRC NRD545	\$1,800
TenTec RX350	\$1,200

Also, a number of amateur HF transceivers have excellent general coverage receivers and shouldn't be discounted for receive-only use:

Icom IC718	\$450
Icom IC746Pro	\$1,350
Yaesu FT847	\$1,550
Kenwood TS570	\$1,100

Finally, for a real splurge, take a look at Ten Tec's semiprofessional RX340 for a cool \$3950.

◆ Luxury Items

Now that we have examined our basic receiver criteria, let's briefly return to some of those technical-sounding "luxury" items that make the most sense from the standpoint of operating convenience:

Memories

Most receivers nowadays offer storage and recall of at least a hundred or so favorite frequencies, together with operating mode and other receiver parameters.

Scanning

It's useful to be able to scan memories listening for activity on known or favorite frequencies or to be able to scan from one dial frequency to another.

Dual VFOs

We frequently swap between the "A" and "B" VFOs on our radio in order to quickly check two frequencies, determine whether each is carrying the same broadcast or for switching quickly between the "go" and "return" frequency on a duplex system.

Automatic Notch

The automatic notch on our radio immediately identifies any annoying whistles close to the main receiver frequency and knocks them out.

Most, if not all, of the receivers listed above have these features and more. As you can no doubt see, the average price of a good, dedicated HF receiver equipped for serious digital listening is around \$1250, with the Icom R75 the cheapest option by far with a price of around \$550. As with any large purchase, though, our advice is to visit your local dealer or someone nearby that owns the radio and give it a thorough "test drive" yourself.

Next month, we will look at some of the best places to search for digital utility stations on the HF dial with your new radio. Until then, enjoy your listening and please keep the letters and e-mails coming.

Glenn Hauser

P.O. Box 1684-MT, Enid, OK 73702

glennhauser@monitoringtimes.com

www.worldofradio.com

Voice of Mediterranean Suddenly Closed

Anker Petersen, Denmark reports: Secretary General of the European DX Council Luigi Cobisi told me that the Managing Director of VOM, Richard Muscat, informed him that Libya no longer can support the VOM financially. From the website of the EDXC, <http://www.edxc.org> –

VOM, the shortwave radio station set up 20 years ago, is to close down on December 31 after the Libyan government informed Malta that “it no longer sees a function for this kind of station” – a joint venture between the Maltese and Libyan governments who each contribute (about \$500,000) to keep it running. But the Libyan government’s payments have not been regular for the past six years and it still owed about \$2,758,700. We say: Malta really need a better partner for this; altho the transmissions via Italy and Russia were hard to hear in North America.

AUSTRALIA R. Australia waited until Nov 17 to revise its schedule for B-03; NAm morning listeners in the morning were shocked to find reliable 9580 closing at 1400, but it resumes at 1800. A new frequency next to it, 9590, runs from 0800 to 1600. In the 1600-1800 gap, perhaps useful in WNAm, are 5995, 6080 and with two transmitters, 7240; starting at 1700 are 9710 and 11880 (from a partial schedule via Ian Johnson, ARDXC)

R. Australia abruptly canceled Feedback in November; on the final edition, it was said to be getting too little response from primary targets As and Pac, and too much from NAm and Eu! Actually it was more about new media than a mailbag. A different show for listener contact only was predicted for early in 2004, at different times with a different sound (gh)

From 1 December, ARDS replaces our system with a 1/2 wavelength dipole array. This should give target area in Arnhem Land a good signal but people such as yourself will probably no longer hear our signal. Thanks for the audio clip (that was my voice) and I will send a postcard (we do not have QSL cards) to identify that you have received our signal (Dale Chesson, Media Services Manager, ARDS, Box 1671, Nhulunbuy NT 0881 <http://www.ards.com.au> via Walter (Volodya) Salmaniv, MD, Victoria, BC, DX Listening Digest) ARDS could hardly be more difficult to DX, but I daresay you can’t control SW signals that precisely, so don’t give up. It’s on 5050v, best chance around 0900-1000 (gh)

BHUTAN BBS increased airtime, opening 7 days a week on 6035 at 0100, a better chance for DXers to catch them! (Anker Petersen, DSWCI DX Window) Heard every night here from 0055 with gongs, fade around 0120, best in mid-winter (Giampiero Bernardini, Milano, Italy, dxing.info)

BOLIVIA On 5952.47, Emisora Pio XII, 0948 a beautiful signal, reading lots of names between instrumental Andean music breaks, then reception literally smashed at 0957 by the triumphal +50dB overblaring trum-pets of Family Radio on 5950, the perfect metaphor for the state of the world these days (Mark Mohrmann, VT, *World Of Radio*)

CHINA [and non] CRI greatly expanded its relays via Canada for B-03, we have observed, lacking any specific info from CRI or RCI! 1100-1200 UTC on 5960 kHz with Real Time Beijing: 1300-1500 9755 and 13675; 2300-2400 6040 and 13680; 0100-0200 9790; 0400-0600 6190 and 9560. Cuban relays are also on other frequencies at some of the same times, but run couple seconds behind, with poor modulation. Thanks for schedules and monitoring by Bob Thomas, Mick Delmage, Joe Hanlon, gh. In mid-Dec, we found 7405 again in use at 1400-1600, presumably direct, and clashing in the first hour with Marti and Cuban jamming. There are also additional CRI relays in Chinese via Canada, such as 1600 on 17735. If it were made public, the complete schedule would be shockingly long.

Meanwhile, European monitors, mainly Wolfgang Büschel, Noel Green and Dave Kenny, were hearing western classical music tests on numerous SW bands, which with the help of Victor Goonetilleke in Sri Lanka, were

France Vossen on RVi Radio World reacts: “It’s all very sad, especially for those who, like me, were in Malta for a Forum at the end of October, extremely well organized by the Voice of the Mediterranean. I do not think I have ever been so well received at any of the many stations I visited in my career. Warm, southern hospitality and generosity is how I would describe it.”

Muscat was accused of wrongdoing, since the internet company running the VOM website employed his son; but auditing showed nothing untoward, notes Andy Sennett in his *Media Network* blog. The webcasts closed quickly Nov 28, but SW continued for a while longer, perhaps until the end of 2003, say Alan Pennington and Dave Kenny, BDXC-UK and via Jean-Michel Aubier, France. More endangered stations: DENMARK, IRELAND, NETHERLANDS, SWITZERLAND, ZANZIBAR

biangulated to a new site in extreme western China, Kashi, or Kashgar. Below 40°N latitude, and at 76°E longitude, it is further south than Ankara or Madrid, and further west than New Delhi. It’s the most effective location within China for CRI broadcasts to Europe, the Middle East, and South Asia. CRI is expanding services, so more and more targets can hear it both in the local morning and evening. Test frequencies included 21850, 21730, 21460, 17480, 15730, 15670, 13860, 13625, 13570, 12065, 11940, 11640, 11460, 9410, 7010 (gh)

COLOMBIA R. Súper, Cali, heard at 1045 not only on its MW fundamental 1199.93 but also on 2nd, 3rd and 4th harmonics with Mexican music: 2399.86, 3599.79, 4799.72. I could not trace the 5th harmonic (Björn Malm, Ecuador, SWB América Latina)

Strong signal varying around 10282 at 2355, clear ID for HJKS, La Voz del Llano, Villavicencio, perhaps harmonic from MW 1020 variable (Björn Malm, Quito, Ecuador, SWB América Latina) Not to be confused with XERMX, also varying around here. At first I thought it was the XERMX blobmitter, but peaking about 10315, extremely distorted screaming preacher until 2300, then Colombian national anthem, and commercial-sounding DJ show. Could be Llano. Next day at 2242-2334, was on 10325-10340 and also 10445, with RCN – Radio Cadena Nacional – IDs fitting Llano (Glenn Hauser, OK, DXLD) La Voz del Llano, 6113.02, at 1040, reactivated! Had not been heard for a long time near its nominal 6115. Stable with good sound quality but very weak. Llanera music and clear IDs, 1100 Colombian anthem (Björn Malm, Quito, Ecuador, SWB América Latina)

La Voz de Tu Conciencia is about to be authorized to operate on 5910 to avoid international interference on 6010, but this does not mean it will abandon 6010 completely, since more than 500 solar-powered radios fix-tuned to that frequency have been distributed. 5910 will have a difference purpose. It’s also negotiating to take over LV de la Pampa in Maicao, which would make it possible to apply for more frequencies in the 31m band (Rafael Rodríguez, Bogotá, Conexión Digital)

COSTA RICA Must-reading on the RFPI website is a point-by-point rebuttal of UFP’s position as expressed in a press release:

<http://www.rfpi.org/UpazPR.pdf>

<http://www.rfpi.org/UpazPR.doc>

James Latham estimated it would take less than \$10,000 to put RFPI back on the air, covering upgrading the hydro plant to power the 10 kW transmitter at the new site, and initial building construction. This could be accomplished in 6 to 12 months. If 7445 cannot be licensed, frequency would likely be in the 6 MHz range. However, everything depends on: a) Obtaining partners who will make a long-term commitment. b) Obtaining a steady income that will sustain RFPI during and after reconstruction. The \$10,000 figure does not include income needed for RFPI staff salaries, and other expenses, such as licensing (via Franklin Seiberling, Copy Exchange and DXLD)

A sad note: RFPI’s mascot, Paz The Cat, disappeared about the time RFPI staff had to evacuate their building. So far searching for her has been to no avail; hope is that

All times UTC; All frequencies kHz; * before hr = sign on, * after hr = sign off; // = parallel programming; + = continuing but not monitored; 2x freq = 2nd harmonic; B-03 = winter season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated

the cat found a new home, the guards at UPaz have been known to shoot dogs in the area (James Latham, RFPI) Maurice Strong, Canadian environmentalist and diplomat, has won the Public Welfare Medal, from the National Academy of Sciences in the U.S., for his role in organizing global conferences (Tim Harper, *Toronto Star* via Carlos Coimbra, Ont.) Not for closing down RFPI ??

CUBA Month after month, at least one SW transmitter here has been badly undermodulated, but emitting a constant squeal. Some of these affect Radio Habana itself, such as 9820; or the CRI relays, on 17720, 9790, for instance. Steve Waldee, retired radio transmitter engineer and audio processing specialist, San José, CA, analyzed the squeals and concluded they are most likely the result of a maladjusted studio-transmitter link. Read (and hear) all about it at:

<http://home.earthlink.net/~srw-swing/RHC/index.html> (gh) I created a tiny URL for this; you should do this more often: <http://www.tinyurl.com/wsby> (George Thurman, TX, DXLD)

Bubble jamming heard at 2040-2130 on 13630 QRMing CRI via Mali in English; from Cuba? Why would they do that? (Mark Taylor, WI, DXLD) R. Martí was on 13630 in the A-03 season, but the dentrocubanos had not caught on yet that it moved away in B-03, so their good Chinese friends, who also jam, were getting jammed! Shhh, fewer jammers on a real Martí frequency. More under USA (gh)

Radio Martí boosted its news schedule Dec 1, so that each newscast lasts two hours instead of one, requiring rescheduling; Cubanola musical nostalgia moved to Sat 1800 on 17670, 15330, 13820, 11930 (Dino Bloisse, FL, DXLD)

DENMARK Danmarks Radio planned to cease all SW broadcasts on 31 Dec. It broadcast only to Danish expatriates; says interest in SW service has been falling. From 15 Dec 2003, DR extended its Internet service by offering streams of all regional programs and national networks. And from 1 January 2004, Danish expatriates can subscribe to a free service offering a CD every 14 days containing 10-20 hours of radio programs (Andy Sennitt, *Media Network* blog)

WMR, World Music Radio's new offices and studio will be ready in January. New 10 kW SW transmitter expected late Jan and official relaunch planned for Feb on 5815, 15810, and Internet (<http://www.wmr.dk> via Dave Harries, England, *hard-core-dx*)

ECUADOR Radio Centinela del Sur, Loja, reactivated, heard at 1055 on 4772.86 kHz, ex-4770.07. Very good strength, ads and local news (Björn Malm, Quito, SWB América Latina) Then shifted to 4773.6, sign-off around 0013 (Michael Schnitzer, Germany, dxing.info; Dave Valko, PA, *Cumbre DX*)

Radio Panamericana, Quero, MW 1589.27, also heard at 0100 on 2nd, 3rd and 4th harmonics, 3178.55, 4767.81, 6357.11. Was heard by a Swedish DXer years ago on 4767 (Björn Malm, Quito, SWB América Latina)

FRANCE [non] RFI relays in English via Merlin B-03: 1200-1227 17815 Ascension 250 kW 027°; 1600-1657 9730 S Africa 250 kW 005°; 1600-1657 15160 S Africa 250 kW 328° (Observer, Bulgaria)

GREECE VOG's It's All Greek to Me music show presented in English would have shifted to 1900 UT Sun on 17705 via Delano, but in Nov this was covered by sports, and IAGTM appeared instead Sun at 1105-1200, before the Delano relay on 9690 starts, but available direct on 15630, 11645 (John Babbis, DXLD) The only other weekly English hour on 17705, *Hellenes Around the World* is Sat at 1700, but also subject to pre-emption by ball games (gh) Foreign language service, no longer called Orientations, 1200-1600 on 15650, 1600-2000 on 12105: many languages include direct relay of BBC news, and can be paralleled with BBC frequencies then on air. These include Arabic 1400 // 15180 13660, Russian 1500 off-line?, Romanian // 6050 at 1607, Turkish - 1655 // 5875, Serbian 1703 // 6050, Bulgarian off-line? at 1754, Albanian at 1801 (Noel Green, UK, DXLD)

GUATEMALA R. Tezulutlán not heard at my receiver for years, although it is still listed in PWBR 2004 on 3370 and 4835. Anyone hearing them? (Hans Johnson, Naples FL, *Cumbredx*) Father Bernadine Ness, who lives in Cobán, reports that Radio Tezulutlán has abandoned HF in favor of FM. I have not heard them in Minnesota since the fall of 2002 (Mike Gorniak, DXLD)

GUYANA Voice of Guyana, 3291.3 at 0945, strong. Color commentary of sporting event, not a rare catch, but sounds like it is 100% modulated again after a couple of years of very weak audio. Solid copy, with usual adjacent frequency interference (David Hodgson, TN, DXLD)

IRAN Some English transmissions of VIRI are now called "Voice of Justice," such as 0130-0230 on 6120 and 9580 (Dave Kernick, UK, DXLD) They usually announce the wrong frequencies and/or times. 0130 also loud and clear in Moscow on 9580, not "9835 and 6035" (Sergei Sosedkin, Russia, DXLD) Payback for R. Farda? They certainly bumbled into it, with no publicity – and no doubt virtually no listenership in the US (gh)

0030 and 0130 broadcasts ID as The Voice of Justice; I listen not on SW but on satellite, T5/Ku 11830 MHz/SR 20781/H. Islamic orientation to the core, anti-Zionist; but American progressives frequently heard, such as Molly Ivins, Michael Moore; reading from Al Gore's lecture "Freedom and Security." Can't tell if announcers, especially on mailbag, are native or expatriates, but their English quite good; names given on air indicate former. What on earth is the world coming to when one of my favorite media outlets has become VIRI/VJ? – Recognizing that some of their utterances are deficient in credibility; a situation not unique to them (Loren Cox., Jr., KY, DXLD)

[non] Voice of Iran, in Farsi at 1630-1830 had been via France but B-03 moved to Tashkent, 100 kW, 256°, on 11520, very strong here

but with spurs +/- 46v/92v/138v kHz. Shortly later moved again, to 7580, excellent, no spurs, unlD site (Observer, Bulgaria)

IRELAND [non] In late Nov and early Dec, instead of regular programming, RTE was running a loop asking SWLs to contact them at sw@ rte.ie for they were "reviewing" their SW services. Asked if we have internet or satellite radio access. Sounds like another station about to leave SW (Chris Campbell, OH, and Mick Delmage, AB, DXLD) Reply said: "the messages will inform our future SW strategy" (Lennie Kaye, Technical Operations Manager, RTE, via Kraig Krist, DXLD) Well, it has been just an automatic pickup of a certain half hour of the domestic service, not properly produced for SW (gh) Check if they're still to be heard at 0130 on 6155, 1000 on 15280, 1800 on 9850, 1830 on 13640, 21630 (via Observer, Bulgaria)

KENYA KBC Nairobi, 4915, heard at 1830 in local language and Afro music, fading at times well over Ghana. Sign-off at 1905 after National Anthem (Jari Savolainen, Finland, *World of Radio*) The only active SW frequency in Kenya, M-F only at 0300-0700, 1300-1905 (Chris Greenway, *ibid*)

KUWAIT Some of R. Kuwait's English Programs, 0500-0800 on 15110 to S&SE Asia, Au & NZ; 1800-2100 on 11990 to Eu, NAm, CAm: 0505 and 1802 The G.C.C. March [= regional anthem? Gulf Coördination Council]; 0515 & 1815 Islam The Religion of Truth & Justice; 0600 & 1830 News; 0540 & 1900 Kuwait Land of Prosperity; 0615 & 1930 Theatre in Kuwait; 2030 Care of the Handicapped in Kuwait & Social Welfare. Days of week not specified (R. Kuwait B-03 printed folder, via Richard Lemke, Alberta)

KYRGYZSTAN Kyrgyz State Radio, on <http://www.ktr.kg> includes multilingual news block in Kyrgyz, Russian, English, M-F 0100-0120 and 0300-0320, on 4010, maybe also 4795 (Bernd Trutnau, Lithuania, DXLD)

LAOS 7145 is back with the International Service: 1130 Thai, 1200 Vietnamese, 1230 Khmer, 1300 French, 1330-1400 English. Modulation a little weaker than before (Victor Goonetilleke, Sri Lanka, BC-DX) 6130, Lao National Radio, Vientiane, 1150-1215, light Asian music, 1158 "dreamy" Asian flutes and strings, several gongs similar to BBC hour chimes, all the same tone, brief presumed ID, then orchestral / flutes anthem, news (Roger Chambers, Utica, New York, DXLD)

MÉXICO XERMX blobmitter one evening at 0040-0100 was on 10325, a huge blob of noise, not NBFM, blocking India on 10330 (Tim Hendel, AL, DXLD) At 1445 I found it at 10450-10475, yes, covering 25 kHz, and by 1500 had drifted down to 10435-10460. At least India 10330 was in the clear. Next day at 1512 check, the blob covered 10430-10445 or so, not so strong, only trashing 15 kHz. Another day at 1513 centered around 10355, fortunately far enough away from India 10330. Not to be confused with COLOMBIA, q.v. (Glenn Hauser, OK, DXLD) Very distorted classical and jazz around 0300 on 10359, tentatively XERMX (Björn Malm, Quito, Ecuador, SWB América Latina) More recently around 1400 in the 9425-9440 area (gh)

MONGOLIA Domestic SW system was completed last summer with US\$10 million from the Japanese government. Operates 2200-1600 with weather, news and Mongolian music, essential to nomadic people who move almost every week. There are three stations:

Ulaanbaatar, opened Sep 8, 2003. One 50 kW transmitter servicing E. Mongolia and metropolitan area on 7260, with alternate frequencies 4850 and 9590.

Altai, opened Aug 8, 2003. Two 10 kW transmitters servicing SW Mongolia on 4830, alternates 6170 & 9530.

Murun, opened Jul 26, 2003. Two 10 kW transmitters servicing NW Mongolia on 4895, alternates 6190 & 9560. Koji Yamada visited Mongolia and obtained this information (JSWC)

NETHERLANDS In Nov and Dec, RN faced a series of threats from the government of further major cuts, coupled with bad press in newspapers such as *NRC Handelsblad*. Follow the ups and downs of this in postings in the archives of the *Media Network* blog <http://medianetwork.blogspot.com/> Examples:

"Radio Netherlands Director General Lodewijk Bouwens says that the organisation will do everything in its power to prevent the Dutch international service being destroyed by State Secretary Medy van der Laan." Andy Sennitt opines: "Radio Netherlands is being treated by this government as just another branch of domestic broadcasting, with no special consideration being given to the unique needs of an international broadcaster – high transmission costs, the need to maintain a 24 hour live news service, etc. Someone has to grasp the nettle and ensure that Radio Netherlands is not dismantled piece by piece like the broadcasting equivalent of Lego. That should be the Ministry of Foreign Affairs, where the guarantees of the long-term future of Radio Netherlands lie." And later:

"A full session of the Lower House of the Dutch parliament has adopted a motion requiring that State Secretary Medy van der Laan consult with the Ministries of Foreign and Economic Affairs concerning her proposals for further cuts in RN's budget from 2005, before bringing revised proposals before the House" (via gh)

NEW ZEALAND RNZI sked revised 21 December, until 28 March: 1751 11980, 1951 15265, 2238 17675, 0400 15340, 0800 9885, 1100 15530, 1300 9870 (via Paul Ormandy, ZL4PW, DXLD)

PARAGUAY A profile of ZP30, La Voz del Chaco Paraguayo, the Mennonite station on MW 610 in ten languages including English, mentions that it is "accessible" on 6884-USB, but this may mean for two-way contact rather than broadcasts, as it follows their phone numbers. <http://www.zp30.com.py/zp30/Espanol1.htm> (via Arnaldo Slaen, Argentina, *Conexión Digital*)

Shortwave Broadcasting

PERÚ R. Libertad, in the Cajamarca region, heard on 1999.26v at 1030, a sesqui-harmonic from 1332.85v, where also heard, starting *Alegria en Los Andes* (Björn Malm, Ecuador, SWB *América Latina*)

R. Uno, Chiclayo, quite good at 1115 on 2550v, drifting 2545 to 2560, 2 x 1280v, with religious program \\\ R. Imperio, Chiclayo on 4386.6 and another day with birthday greetings and local IDs.

Radio Cielo, Chiclayo, 5628.80v, reactivated in mid-Dec; at 2355 ID, good signal but distorted audio (Björn Malm, Ecuador, SWB *América Latina*) 2 kHz lower next day at 1110, multiple IDs with echo, overmodulated and muffled (John Sgrulletta, NY, via Malm)

ROMANIA RRI Letterbox replied to a reception complaint that they are considering Sackville and/or other relay sites to improve reception in NAm (Kraig Krist, VA, DXLD)

RWANDA Since Slovakia quit 6055 after 1900, R. Rwanda has clear channel at 1912 in vernacular until close down at 2100 (Noel R. Green & Ray Browell, UK, Cumbredx)

SLOVAKIA RSI mothballed one of three transmitters Dec. 1, leaving these in English: 0100-0127 N/SAm 5930, 9440; 0700-0727 Au 13715 15460; 1730-1757 & 1930-1957 WEu 5915 7345 (Observer, Bulgaria)

SOLOMON ISLANDS I've returned from two weeks on Guadalcanal helping SIBC repair their 10 kW MF transmitter and getting 9545 back on air. I was working on restoring the 9545 daytime channel which, like 5020 will actually run 24 hours, so it should get across the Pacific from time to time. It will be 10 kW into a simple, low dipole at first; then I'll build a slightly more advanced four element collinear to optimise the azimuth and elevation patterns for the Solomon Islands. Site is about 12 km out of Honiara on an old military air field about half-mile from Bloody Ridge. Still signs of the war all about (Nigel Holmes, Radio Australia, via George Poppin, *World of Radio*)

SOMALIA R. Gaalkackyo has shifted back to its former frequency 6980 from 7335 which it had been using recently. A nice signal here in Nairobi, more-or-less on-channel and operating in DSB mode (Chris Greenway, Kenya, *World of Radio*)

SUDAN [non] 15530, Sudan R. Service, via Woofferton UK, *1500-1700*, opening and closing ID in six languages, address in Nairobi, news in English at 1515 and 1615; second hour may be a repeat (Anker Petersen, Denmark, DSWCI DX Window)

SURINAME R. Apintie reactivated, 4990, at 0210 with same DJ in English heard in the past (Dave Valko, PA, Cumbre DX) As early as 2230, as late as 0450, partly in Dutch, no official IDs on hour but in passing. Better than before and no longer off-frequency. Their old unit was a 50 watt Phillips to a 1000 watt Sunair amplifier (George Maroti NY, Cumbre DX) We are pleased to hear that our new Omnitronix 1000 watt transmitter is giving a better signal, on the air since 12 December at 500 watts for testing (Charles Vervuurt, R. Apintie, via Maroti, Cumbredx)

SWEDEN/VIETNAM R. Sweden reported in *MediaScan* that its 1300 Swedish broadcast to Asia on 9920 was being jammed by Vietnam, despite Sweden having given aid to Vietnam broadcasting! This was because FEBC Philippines has a service in Vietnamese minority languages also on 9920 until 1245, and the jammers were not being turned off promptly (gh)

SWITZERLAND Every time I open the envelope from swissinfo I feel a bit sad, remembering what a great station Swiss Radio International was (especially for Italians abroad, as Rai always suffered reception problems). Now these leaflets, mainly promoting [swissinfo.org](http://www.swissinfo.org) seem like casualty bulletins to me. Shortwave broadcasts will end for good in less than one year. But even satellite broadcasts are not in good shape, and SwissMix on Eutelsat HB3 for Europe and Worldspace for Asia, will disappear March 31 (Stefano Valianti, Southern European Report, Dec BDXC-UK Communication)

Swissinfo/SRI is expected to lose 35 out of a total of 147 full time jobs when the government reduces its annual subsidy from the current 18 million Swiss francs to just 5 million in 2005. From 2006 the subsidy is due to be removed completely. German, French, Italian and English services will be the worst hit, with little or no impact on other languages (Andy Sennitt, *Media Network* blog)

TANGANYIKA R. Tanzania, Dar es Salaam, 5050, real pleased to log this at 2031-2101*, talks and music, tentative ID, anthem at sign-off (Scott R. Barbour, Jr., NH, DXLD) see also ZANZIBAR

TATARSTAN The program Tatarstan Dulkynda (*Na volne Tatarstana*), formerly Voice of Tatarstan, winter schedule: 0500-0600 and 0700-0800 on 15105, 0900-1000 on 11915. Considerable QRM at 0700-0730 from co-channel Romania in English (Dmitri Mezin, Kazan, DSWCI DX Window)

TURKEY At 2305 on 9655, a station seemingly in English but unless listening carefully, would take it for Chinese from the intonation, and slurred sibilants! Wonder if the VOT announcer is really from China or that's just her peculiar way of expressiveness. Flutter fading added to the effect (Glenn Hauser, OK, DXLD)

USA VOA is going to bombard Pakistan from January with 24-hour broadcasts made up mostly of pop American and Pakistani music, news, interviews and commentary. VOA is even going to change its name in an obvious effort to de-emphasise the fact that it is owned and operated by the US government. The new name for the jazzed up 24-hour service is 'Radio Aap Ki Dunya.' Why Pakistan has been chosen for this special saturation-style coverage, no one at VOA is prepared to say.

Meanwhile, AFGE, Local 1812, the union representing many VOA employees, has lodged a strong protest at what it considers the

dismantling of a service set up in 1942 as part of American public diplomacy. The Arabic service of the VOA has already been abolished and is now known as Radio Sawa, broadcasting music and light entertainment, and the Persian service goes out as Radio Farda. It also accuses VOA of shedding its universally known and recognized brand name. A union member said the White House has sent its "well-paid undertakers" to gradually kill VOA and bury it forever. Money saved will be spent on fueling the war machine.

Urdu would be on air from 0400 to 1600 UT on SW; 24-hour broadcasting was expected to start from January 1 on MW with the aid of a new transmitter the US has been able to establish in Tajikistan. Target audience of the pop-oriented programming is the age group 19-39. VOA has already hired seven relatively young people, all Pakistani or of Pakistani origin, to convert the Urdu broadcasts into FM style musicals for round-the-clock broadcasting. Among those hired are Ms. Nafisa Hoodbhoy, sister of Pakistani physicist Dr. Pervez Hoodbhoy, as well as a former Radio Pakistan broadcaster Asad Nazir (Khalid Hasan, *Pakistan Daily Times* via Mike Terry) Aap ki Dunyá means "Your World" (Swapan Chakraborty, Kolkata, India; Jose Jacob, Hyderabad, India; Tim Hendel, AL, DXLD)

Worker unrest at the Voice of America — not just cutting English by 5 hours a day, but irradiating food, size of cubicles, etc.: <http://www.afge1812.org/> (gh)

Cuba is jamming not only R. Marti, heavily, but also VOA, at least lightly, since VOA has a show called *Ventana a Cuba*, daily at 0100-0130; bubble jamming is heard on all five frequencies, 9480, 9560, 9885, 11700, 11990. Trouble is, the jamming continues after 0130, marring VOA's Spanish service to all the Americas for another half hour, and may even stay on later blocking other broadcasters such as RKI via Canada in English at 0200 on 9560 (gh, John Carver, IN)

The two 100 kW transmitters (one for KVOH) purchased from FEBA Seychelles arrived in mid-Dec. They are huge, industrial requiring massive water pipes and everything. It will be quite some time before we get them on the air (Morgan Freeman, WJCR, *World of Radio*)

WBCQ, 5105.2, put out a slightly distorted, wobbly spur on 4846.6v at 0330-0400+ (Brian Alexander, PA, Mechanicsburg PA, DXLD)

WWCR has a new two-hour musical program in Tamil, *Ragam*, Sun 1300-1500 on 12160. It was on the Dec schedule, but expected to start in Jan (gh)

WWRB is testing on various frequencies and times full digital broadcasting. The AOR ARD 9800 on the market for \$500 or less can decode the WWRB digital signal. WWRB is testing full carrier AM, also SSB. The upper sideband will be analog with the lower side band digital. WWRB is seeking individuals to help evaluate this mode. Please contact WWRB via our web page E mail button. We are using an AOR 9800 Encoder to produce the digital signal. This off the shelf today technology is very inexpensive, easily obtained requiring no modifications to shortwave radios in the field. It is plug and play; Requires 12 volts DC + headphone audio; check it out at <http://www.aorusa.com> This could be a very exciting mode of operation for Hams and SWLs and Content listeners. Our transmitters can produce 600 kW peak pulse power at 80 percent duty cycle, so we can produce a very potent digital pulse signal. A ham buddy in Oklahoma City heard us loud and clear, no static and full quieting, on 6890 (Dave Frantz, WWRB, DXLD) Not to be confused with DRM (gh)

Full DRM membership is or was \$10,000 per year. Associate membership is free, if you qualify. The NASB has been an associate member for years, and we pay nothing. Furthermore, DRM is non-proprietary and there are no license fees as far as I am aware. There are three or four NASB members (including WRMI) that are actually interested in transmitting in DRM from their own facilities, and we are working with the FCC to establish some technical standards and administrative procedures. One of the big drawbacks is the cost of the few DRM excitors that are available commercially to convert analog transmitters. But there could be more competition in the near future and perhaps lower costs, and some stations might even be able to build their own. The next couple of years could be very interesting (Jeff White, WRMI/NASB, DXLD)

VENEZUELA [non] Alo, Presidente Sundays from 1400 or later, via Cuba heard on five frequencies matching those on RHC website: 11670, with heavy co-channel at first; 11875, 13680; best on 13750 and 17750 (gh)

VIETNAM [non] Voice of Khmer Kampuchea-Krom in Khmer: 1400-1500 Tuesdays on 11550, Vladivostok 250 kW, 230° (Observer, Bulgaria) This placement is not a mistake: it's for Cambodians in Vietnam

ZANZIBAR No trace of 11734, normally a nightly guest (Wolfgang Büschel and Thorsten Hallmann, Germany, late Nov, BC-DX) Zanzibar not heard here in several days on 11734.1 (Steve Lare, MI, DXLD) I can confirm that Zanzibar does indeed seem to be off the air on 11734. Nothing heard on that frequency here in Nairobi. Still going on 585 MW. But 6015 is missing too (Chris Greenway, Kenya, DXLD)

ZIMBABWE ZBC is now on 6045, apparently a move from 5975. Rather a weak signal, not nearly as good as nearby Zambia on 6165 (Chris Greenway, Nairobi, *World of Radio*) Besides spending gigadollars-Z to monitor and censor the Internet, Pres. Mugabe plans to start a 24-hour propaganda SW service (*Media Network* blog) Until the Next, Best of DX and 73 de Glenn!

0013 UTC on 2390

MEXICO: Radio Huayacocota. Spanish news items to banda music. Station identification at 0025. SINPO 24332. (George Maroti, NY/NASWA Flash Sheet).

0045 UTC on 4985

BRAZIL: Radio Brasil. Portuguese news text to lively Braz pops. Brazilian's audible, **Radio Difusora Roraima** 4875, 0258 (Stewart MacKenzie, Huntington Beach, CA). **Radio Aparecida** 9630, 2102-2115 (Arnaldo Slaen, Buenos Aires, Argentina) **Radio Rural** 4765, 0113-0122 (Scott Barbour, Interval, NH/HCDX) **Radio Aparecida** 6135, 2255-2302+. (Harold Fodge, Midland, MI) **Radio Nova Visao** 11735, 0855-0925. (Rich D'Angelo, PA/NASWA Flash Sheet) **Radio Guaruja Paulista** 5045, 0750. (Jerry Berg, MA/DX Window)

0130 UTC on 5055

COSTA RICA: Faro del Caribe. Poor to weak signal at tune-in. Discernible ID to religious text. (Tom Banks, Dallas, TX) **Radio Exterior de Espana**, Costa Rican relay 3350, 0534-0601*. (Fodge, MI)

0223 UTC on 4780

GUATEMALA: Radio Coatan. Music program of soft vocals and Spanish talk by male with IDs. Closedown identification to "echo-effect" sign-off announcements at 0238, accompanied by instrumental music at 0240. No national anthem. Poor to fair signal. (D'Angelo, PA/NASWA) **Radio Verdad** 4052.53, 1122; **Radio Kekchi** 4844.94, 1230-1240; **Radio Cultural** 4780, 1235-1240. (Robert Wilkner, Popano Beach, FL/HCDX)

0305 UTC on 5070

USA: WWCR. Bob Padula's EDXP program, followed by *Real Living* with Allan at 0317. DRM and DAB news updates; 15825, 2059-2158. 9475 freq shift to interval signal and Spanish identification. **WRMI** 7385, 0330; **AFRTS** 5446, 0107; **WINB** 9320, 0230. (MacKenzie, CA)

0308 UTC on 4250.8

CLANDESTINE: Voice of Strugglers of Iranian Kurdistan. Symphonic music to Kurdish ID, "aira Khabati Kurdistani Iran." Political talk about Iran to brief talk. Farsi identification at 0343 and talk. Additional Clandestine's observed; **Voice of Komala** 3928.3, *0326-0440 Kurdish; **Voice of Iranian Revolution** 3880.6, *0330-0340 Kurdish; **Voice of Iranian Kurdistan** 3970, 0330 Kurdish; **Voice of the People of Kurdistan** 4025.8, 0345-0410; **Voice of the Conservative Party of Kurdistan**. (Anker Petersen, Denmark/DX Window)

0320 UTC on 4800

LESOTHO: Radio Lesotho. Fair audio level during local talk in presumed Sesotho. Regional music and announcements to clear station identification. Heard on subsequent evenings. (Banks, TX; Van Horn, NC)

0340 UTC on 4949.98

ANGOLA: Radio Nacional. All nite-program of easy-listening music. Station ID at 0400 to brief Portuguese local news items and magazine format program. Signal best at tune-in but still solid and in the clear at 0420. (Al Quagliari, NY/DX Window)

0523 UTC on 3279.55

ECUADOR: La Voz del Napo. Spanish Catholic mass with muted male announcer at 0530. (Fodge, MI)

0616 UTC on 6139.82

COLOMBIA: Radio Melodia. Spanish text to musical program. Station identifications for shortwave and AM freqs. Best to monitor in LSB. (Nicholas Eramo, ARG/HCDX) Colombian, **LV del Guaviare** 6035, 1026-1039. (Barbour, NH/HCDX)

0840 UTC on 5906.19

PERU: Radio Melodia. Spanish. Tecnocumbias tunes to "Melodia en los Andes" ID. Local time check and public service announcement. SINPO 34333; **Radio Altura** 6479.45, 0000-0012 (Slaen, ARG) **Radio Imperio** 4386.7, 1015 Spanish text presumed to be religious, 1025 identification. (Frank Hillton, Charleston, SC) **Radio Victoria** 6020.2, 0206-0235. (D'Angelo, PA/NASWA) **Radio Libertad** 5039.26, 1030 identification. (Wilkner, FL/HCDX)

1245 UTC on 15390

AUSTRALIA: HCJB, Kununurra. English commentary at tune-in. Contemporary religious music to "HCJB Voice of the Great Southland" identification. Poor to fair signal quality amid deep fades. (Steven Vincent, Omaha, NE)

1503 UTC on 21500

CHILE: Christian Voice: Portuguese DX program, *Altas Ondas*. Announcer's mention of Dixer Claudio Rotolo de Moraes from

Florianopolis, Brazil. SINPO 44444. (Slaen, ARG) 21500, 1748-1802+. (Fodge, MI) 21500, 1933 (MacKenzie, CA) Chile's **Radio Parinacota** 6010, 0840-0850. (Slaen, ARG)

1639 UTC on 7385

TIBET: Xizang PBS, Lhasa. English/Tibetan talks on extended schedule. SINPO 44343, heard // 4905, 4920, 6110, 5240. Chinese service 4820, 1645-1656 with All India Radio noted underneath. (Petersen, DNK/DX Window) **Xizang PBS, Urumqi** 4480, 1707-1721 Chinese // 5060. (Carlos Goncalves, Portugal, DX Window; Barbour, NH/NASWA) **Xizang PBS, Lhasa** 4920, 2340. (Slaen, ARG)

1730 UTC on 21470

ASCENSION ISLANDS: BBC relay. Press Review & Focus segment with African items of interest. Public service announcements to BBC identification and sports roundup. (Fodge, MI) Audible 17885, 1950, // 15105; 17830, 2000, // 15400. (MacKenzie, CA)

1802 UTC on 21645

FRENCH GUINEA: Radio France Int'l relay. Spanish new to 1809. Sports update and "RFI" identification into *En Focus* commentary on Venezuelan President Chavez. Weak signal and rumble interferences. (Fodge, MI)

1910 UTC on 9525

SWAZILAND: TWR. English/Vernaculars. Station IDs with mention of Swaziland to religious sermon segment and gospel hymns. Fair signal quality. (Banks, TX) 7235, 2214-2227*. (D'Angelo, PA/NASWA)

1925 UTC on 9535

THAILAND: Radio Thailand. Announcer's talk to south east Asian instruments. Various program sound bites and economic updates. Poor signal quality with rough copy. (Barbour NH/HCDX)

1942 UTC on 17895

MOROCCO: VOA relay. Interview with artist *Earth, Wind and Fire* about their classic tunes, // 15240, // 15580 via Greenville, NC. (MacKenzie, CA)

1955 UTC on 13735

SAO TOME: VOA. French service including soul/blues tunes. Station ID at 2000, followed by jazz selections. SIO 353+; 6035, 2217-2221+ English. (Fodge, MI)

2000 UTC on 17895

BOTSWANA: VOA relay. Time check, to identification for African Service. Report on Liberia to news update. (William McGuire, Cheverly, MD)

2020 UTC on 17735

RWANDA: Deutsche Welle relay. Two announcer's Portuguese chat to DW identification at 2021, // **Rwanda** 9875 German, 13,780, 2325, // 17860, // 11955 **Antigua**, 11690 **Canada**, 9545 **Germany**. (MacKenzie, CA)

2054 UTC on 15110

SPAIN: Radio Exterior de Espana. Spanish text to ID, followed rock tunes. (MacKenzie, CA)

2105 UTC on 11760

CUBA: Radio Habana. Newscast at tune-in to sports roundup. Station ID to **DXers Unlimited** by Arnie Coro. French service 9505 at 2130. (Sam Wright, Biloxi, MS) Cuba's **Radio Rebelde** 5025, 0053 with Cuban music and Spanish text. (MacKenzie, CA).

2300 UTC on 6165

BONAIRE: AWR. Spanish musical jingles to ID "Radio Mundial Adventista." Program, *Hogar Feliz* with councils for the family. (Slean, ARG)

2316 UTC on 4845

MAURITANIA: Radio Mauritanie. Arabic news and commentary including items on Iraq and Saudi Arabia. Recitations 2321-2333. Signal weak with utility QRM. (Fodge, MI) Audible 0037 and 0253 with extended Ramadan programming. (MacKenzie, CA)

2330 UTC on 11690

CANADA: Deutsche Welle relay. German service including IDs and national news, to topics covering Africa. (McGuire, MD)

Thanks to our contributors – Have you sent in YOUR logs?

Send to Gayle Van Horn, c/o Monitoring Times (or e-mail gaylevanhorn@monitoringtimes.com) **Please note:** paper strips and cassette recordings will no longer be accepted. English broadcast unless otherwise noted.

More Holiday QSLing

So, how did your National Holiday DXing for January go? In February, we celebrate President's Day on the 16th to honor President's Lincoln and Washington. The carnival season kicks off this month. Look for stations from the Caribbean and Brazil to extend their broadcast hours, for their respective rivalry, anytime from the 20th. Tuesday, the 24th, is Mardi Gras Day (Fat Tuesday) in New Orleans, Louisiana. Coverage begins early on WWL 870 kHz AM from host, Bob Del Giorno. Don't miss this day-long madness!

Don't forget to check these worldwide February holidays for DXing opportunities on amateur, medium wave and shortwave frequencies.

Sri Lanka Independence Day, Feb. 4

New Zealand Waitangi Day, Feb. 6

Tokelau Waitangi Day, Feb. 6

Grenada Independence Day, Feb. 7

Iran Revolution Day, Feb. 11

Lithuania Independence Day, Feb. 16 (from Austria, Germany, Prussian and Russian occupation)

Gambia Independence Day, Feb. 18

St. Lucia Independence Day, Feb. 22

Guyana Republic Day, Feb. 23

Estonia Independence, Feb. 24 (from Soviet Russia)

Kuwait National Day, Feb. 25

Dominican Republic Independence Day, Feb. 27

AMATEUR RADIO

Cayman Islands (Grand Cayman)-ZF2AH, 20 meters SSB. William AWild Bill@ Beyer N2WB, DXpedition. Full data photo card received in 33 days via Joe Hypnarowski-W6VNR, 3785 Mt. Blackburn Avenue, San Diego, CA 92111. (Larry Van Horn, NC)

Chesterfield Islands-TX0AT, 20 meters SSB. Full data photo card received in six months for two US dollars, plus a Euro nested envelope. Received via QSL Manager Alessio Roma-I2OCKI, Sterparo 43, 03023 Ceccano, Italy. DX#166. (Van Horn, NC)

Montserrat (NA-103)-VP2MWB, 17 meters SSB. William AWild Bill@ Beyer N2WB, DXpedition. Full data color card received in 20 days via Robert W. Schenck-QSL Manager-N2OO, P.O. Box 345, Tuckerton, NJ 08087. (Van Horn, NC)

Montserrat (NA-103)-VP2MDO, 10 meters SSB Robert Adamitis, K9MDO, DXpedition, 10 meters SSB. Received in 36 days via Jack Nienhaus-, W9NJB-QSL Manager. 5045 Oak Center Drive, Oak Lawn, IL 60453. 10 meter country # 146. (Van Horn, NC)

AUSTRIA

FEBA Radio via Moosbrunn, 9465 kHz. Full data card signed by Mike Proctor, plus station sticker. Card notes, AThis is a legacy Seychelles QSL card, sent with the compliments of FEBA=s. Spotlight program Production Department. With the closure of Seychelles, we no longer have a QSL Secretary. Received in 14 days for an English report. The postal address for the Spotlight Production office is: P.O. Box 57000, Limassol CY-3509, Cyprus. Email: se@feba.org.cy. (Rich D=Angelo, PA/Cumbe DX)

BELARUS

Radio Minsk, 7210 kHz. Full data handwritten QSL folder, stamped and signed by Stas Lokush-Editor, plus souvenir postcard and station sticker. Received in eight weeks for a taped report, souvenir postcard and one IRC. Station address: Chryvouaya Str. 4, Minsk 220807 Belarus. (Ben Loveless WB9FJO, MI)

DOMINICAN REPUBLIC

Radio Amanecer, 6025 kHz. Full data verification letter signed by Lic. German Lorenzo-General Manager. Received in six months for a Spanish report. Station address: Apartado 1500, Santo Domingo, Dominican Republica Dominicana. (Arnaldo Slaen, Buenos Aires, Argentina)

ISRAEL

Kol Israel (kHz?). No data letter from Sylvia Rapoport-English News, which stated, AUfortunately your report cannot be verified because our engineers no longer use listeners reports. However, the enclosed station card noted

AYour report has been checked and agrees with our log. Received in one month for an English report and one US dollar (refunded). Station address: P.O. Box 1082, Jerusalem, 91010 Israel. (Brian Rogers, Melvindale, MI) Interesting concept, sounds like the left hand doesn=t know what the right hand is doing. This will keep DXers totally confused! - GVH

JAPAN

Radio Tampa, 6055 kHz. Full data globe/music sheet card unsigned. Received in 13 days for a taped report and two IRCs. Station address: 9-15 Akasaka 1-chome, Minato-ku, Tokyo 107-8373, Japan. (Bill Wilkins, Springfield, MO)

MEDIUM WAVE

KBSU, 730 kHz AM. Full data card signed by Steven B. Johnston-Director of Engineering, plus personal letter and station sticker. Received in eight days for an AM report. Station address: KBSU-Boise State University, 1910 University Drive, Boise, ID 83725-1915. (Patrick Martin, Seaside, OR)

KEZX, 730 kHz AM. Full data verification letter signed by Sam Wallington-Director of Engineering. Received in 23 days for an AM report. Station address: EMF Broadcasting, 5700 West Oaks Blvd., Rocklin, CA 95765. (Martin, OR)

KKOB, 770 kHz AM. Full data verification letter signed by Mike Langner-Chief Engineer. Received in 12 days for an AM report. Station address: 500 Fourth St., N.W., Albuquerque, NM 87102-2102. (Patrick Griffith, N0NNK, Westminster, CO)

KMMZ, 1640 kHz AM. Nice verification letter from Hiram Champlin-Owner. Received in seven days for an AM report. Noted they are still in the testing mode at 10,00 watts day and 1,000 watts night. Very pleased with this! Station address: 316 E. Willow, P.O. Box 952, Enid, OK 73702. (Martin, OR)

WRLL, 1690 kHz AM. Full data QSL card from Real Oldies 1690, signed by Len O=Kelly KB9ZCX. Received in 16 days for a taped report. Station address: Clear Channel Communications Chicago, 233 N. Michigan Avenue # 2800, Chicago, IL 60601. Website: <http://www.realoldies1690.com>. (Loveless, MI) Ben, I was listening to this station=s online audio link while I typed this column...great oldies! - GVH

PIRATE

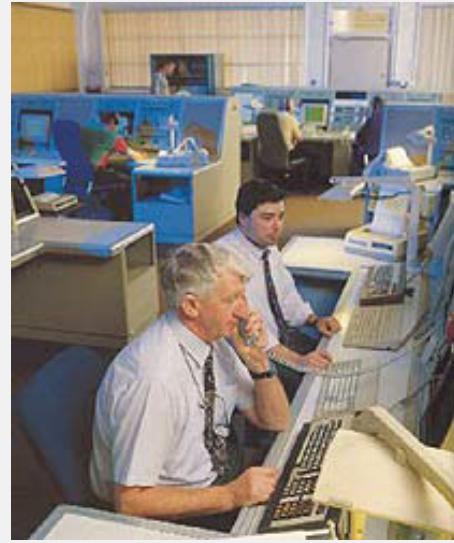
Argentina, Radio Bosques, 6192.73 kHz. Full data card unsigned. Received in 27 days for an email report to radiobosques@yahoo.com.ar. (Nicholas Eramo, Buenos Aires, Argentina/HCDX)

KIPM, 6950 kHz. Full data glossy photo quality Golden Age of KIPM certificate, signed by AMax. Received in three months. QSL maildrop: P.O. Box 69, Elkhorn, NE 68022. (John Wilkins, Wheat Ridge, CO/Cumbe DX)

UTILITY

Ireland; Shannon VOLMET, 5505 kHz SSB. Full data card signed by Denis Connolly-Operations Manager, plus station brochure. Received in 20 days for a taped utility report and one IRC. Station address: Irish Aviation Authority, Shannon Aeradio, Ballygirreen, Newmarket-on-Fergus, Co. Clare, Republic of Ireland. Website: <http://www.iaa.ie> (Loveless, MI)

USA; WLO, 8731 kHz SSB. Full data color computer-generated QSL card, unsigned. Received in two weeks for a utility report, one US dollar and address label (used for reply). Station address: LLC/WLO, 7700 Rinla Avenue, Mobile, AL 36619. (Wilkins, MO) Bill says he=s been trying for five years to verify WLO. Congrats! - GVH.



Shannon Aeradio courtesy of Irish Aviation Authority

John Figliozzi

johnfigliozzi@monitoringtimes.com

Culture and the Arts

One of the key attractions of listening to international radio is the opportunity to gain insight into other cultures. "The Arts" serve as a window into cultures, for artists – whatever their chosen medium – seek to bring greater awareness to life as it is lived in each of its unique experiences.

Several international radio stations offer excellent arts and cultural programs. This month's column provides a small survey.

[Refer to the time and frequency section of MT's Shortwave Guide. Times in bold are direct shortwave transmissions; those in italics are to other regions but may offer reception here. All programs are also available via live stream and on-demand from the station web sites.]

Spotlight

R. Canada Int.

S/W 2132, M/H 0232

<http://www.rcinet.ca>

One of the bright spots lately within international broadcasting has been the quiet revival of sorts taking place at *Radio Canada International*. *RCI* seems to be finding itself again, reincarnating the station as the place to go to for information about Canada across a wide spectrum of experiences.

One of these experiences is the arts, and **Spotlight** is the weekly *RCI* program that places a keen watch on Canadian culture and the artists and artistic performances that seek to illuminate it.

The *RCI* web site lists Marc Montgomery as the host of the program; but over the last few weeks I've been listening (in December as this is written), Carmel Kilkenny has been the presenter. Both do a fine job moving the program along and bridging the various segments, although I prefer Kilkenny's more traditional, low key style.

Spotlight uses a well-balanced mix (in-house productions, as well as items prepared by the domestic *CBC*) of interviews, reports and discussions to illuminate Canadian literature, visual arts, cultural traditions, music, theatre and cinema. A nice touch to this weekly program is a global calendar of events highlighting where Canadian artists are performing or cultural events are being held around the world.

The uninitiated quickly learn that Canada has a pervasive, though much understated, role in the arts internationally – and this includes in the U.S. – that belies the country's small population.

The Ticket

BBC World Service

M 0206 (Americas stream)

A 1106 (E. Asia); A 1806 (E. Africa); A 2106 (W. Africa)

<http://www.bbcworldservice.com>

If the previous program has a strictly provincial view, **The Ticket** has a sharply contrasting worldwide one.

Mark Coles presents an omnibus arts program that literally travels the globe and actively pursues the arts from all cultural perspectives. Each week, this hour features a big name interview, a live performance, reviews of the latest cinema releases from Hollywood, Bollywood and everywhere in-between, a quiz and reports from a band of regular cultural reporters scattered among the continents.

This is a very pleasant, fast moving and accessible program that effectively mixes coverage of the popular arts with the more sophisticated, (for want of a better term) "higher" cultural activities that used to be the sole staple of *BBC* arts programs. By way of illustration, a December program interviewed author Amy Tan about her new memoirs; carried a report on the re-opening of *La Fenice*, a Venice opera house which burnt to the ground in 1996; included a live performance by Spanish musicians *Radio Tarifa*; and took a look at the work of Kyoichi Tsuzuki, a Japanese photographer with a penchant for snapping fashion-mad monks. The weekly screen section reviewed the final part of the *Lord of the Rings* trilogy – *The Return of the King*, and described the re-emergence of the Afghan film industry with a powerful new movie about a girl who disguises herself as a boy in order to go to school.

The Ticket is one of the "new breed" of *BBC World Service* programs. It is far and away the best of all of them to date.

Spectrum

R. Sweden

A 1330, 1430; S 0230, 0330

(fortnightly, 1st & 3rd weekends of the month)

<http://www.sr.se/rs/>

Of all the international broadcasters, *Radio Sweden* may be the most underappreciated and unrecognized. Its consistently crisp, smart and well-produced programming always provides the listener a pleasant and informative half-hour and this record is just as keenly on display in its bi-weekly arts program, **Spectrum**.

Longtime *Radio Sweden* producer and presenter Bill Schiller covers the cultural scene in Sweden. Drawing on activities, events and per-

sonalities in Swedish theatre, film, art, literature and music, Schiller mixes interviews, documentaries, reports and soundscapes that show just how vibrant the arts are in Stockholm, Sweden's other cities and regions and – on occasion – different corners of Scandinavia.

Arts on the Air

Deutsche Welle

T 0530, 1030, 1930, 2130, 2330

<http://www.dw-world.de>

This finely crafted magazine-style program's brief is the European arts scene, but its first focus is on the arts in Germany. Whether it's the Berlin Film Festival or Bayreuth's Wagner Festival, the listener can count on full coverage from a variety of perspectives.

The presenter is Breandain O'Shea, an Australian born musician who enthusiastically interviews, reports on and introduces performers and performances, events and festivals, cultural ideas and attitudes. A recent program profiled Bechstein, one of Germany's leading piano manufacturers, on its 150th anniversary; violinist Frank Peter Zimmermann; and The Norwich Puppet Theatre, known internationally for its imaginative puppetry.

Arts on the Air was the winner of the Gold Medal for Arts Programs at the 2002 New York International Radio Festivals. (The 2130 broadcast to West Africa is the one best heard in at least the eastern half of North America, as *DW* no longer targets the continent on shortwave.)

Vox Humana

R. Netherlands

S 1230, 2000; M 0030, 0130, 0430

<http://www.rnw.nl>

This is a fascinating, but somewhat peculiar, new offering from *Radio Netherlands*. It is described in *RN*'s "On Target" newsletter as "a celebration of the Human Voice" and represents a combining of the perennial award-winning efforts of producers Michele Ernsting, Dheera Sujan (**The Sound Fountain**) and David Swatling (**Aural Tapestry**).

Happily experimental in nature ("Imagining Farm Machinery" was a recent offering), **Vox Humana** is definitely a new take on the meaning of culture. It emphasizes stories over drama, dreams over ideas, songs over symphonies and poetry over prose. It seeks to get to the core of culture by examining emotions and the intimate, the ordinary and the extraordinary, misfits and heroes. At the root, though, is speech – that "human voice." It seems such a natural place for radio to be.

How to Use the Shortwave Guide

0000-0100 whfa USA, Voice of America
 ① ② ⑤ ③ ④

5995am 6130ca 7405am 9455af
 ⑥ ⑦

Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Standard Time) 5, 6, 7 or 8 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 7:30 pm Eastern, 6:30 pm Central, etc.).

Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes

s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑥, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "vl" (various languages).

Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑦ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and *MT* readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas

af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
om:	omnidirectional
pa:	Pacific
sa:	South America
va:	various

Choose a program or station you want to hear.

Selected programs for prime listening hours appear following the frequencies – space does not permit 24 hour listings nor can every station be listed. However, listings for the most popular stations and selected lesser-known stations illustrate the variety available on shortwave. The format of the listings alternates among three different styles – by station, by genre and by day – month by month. Times listed are approximate and programs are subject to change.

The program listings emphasize broadcasts targeted to North America. In most cases, the stations and programs listed should be readily receivable in North America using a portable radio. Most broadcasters produce one broadcast in English per day that is repeated over a 24 hour period to all areas. If you are able to listen to transmissions to other areas of the world during "non-prime time" hours, referring to the prime time listings for those stations will likely be helpful in determining what programs will be broadcast.

Occasionally, a program or station listing may be followed by a reference to another listing for the same program or station at a different time. This is done to conserve space and make it possible to provide more listings.

MT Monitoring Team

Gayle Van Horn Frequency Manager gaylevanhorn@monitoringtimes.com	John Figliozzi Program Manager johnfigliozzi@monitoringtimes.com
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Mark Fine, VA
markfine@monitoringtimes.com

Program Highlights

John Figliozzi

◆ From the BBC

We don't often highlight *BBC World Service* programs in this space. The Beeb already has quite a public relations machine of its own—not the least of which is its excellent program guide magazine *BBC On-Air*, to which we assume most of you are already subscribed. However, there are two interesting new offerings that we would like to bring to your attention.

Age of Empire is a timely series wherein the BBC's Defence Correspondent Jonathan Marcus examines America's place in the modern world, in light of recent events and from a number of perspectives. **Passport Please** examines national identity in a globalizing world. The last three parts look at Peru, China and Iran.

◆ From Voice of Russia

The *Voice of Russia* has introduced some new programs. Several are devoted to the city of St. Petersburg. In the **Musical Portraits** series, *Musical Tales of St. Petersburg* features outstanding musicians who at various times lived in Russia's northern capital. *Musical Treasures of St. Petersburg* is a series of twelve monthly programs within **Music and Musicians** featuring famous musicians, prominent events, glorious premieres and utterly unknown music discovered in the city's archives. *St. Petersburg: Three Glorious Centuries*, within the weekly feature **Russia: People & Events**, is about the city's rich history, cultural and spiritual life.

Other recent additions include: **Ladies of Character**, which features local glamorous personalities with original life philosophies; and **Moscow Calling**, which highlights the latest pop and rock releases and includes interviews, guest speakers, and all you wanted to know about the Russian rock scene.

◆ From China R. Int.

CRI is one big broadcaster that is so obviously bucking what some people seem to think is a trend toward the downsizing of shortwave operations. At press time, *CRI* was experimenting with shortwave delivery in North America of **Realtime Beijing**, at 1100 on 5960. **Realtime Beijing** is a daily magazine—originally broadcast only domestically for an English speaking audience—that looks at Chinese politics, society, economics and culture.

0000 UTC - 7PM EST / 6PM CST / 4PM PST

0000 0007	Sierra Leone, SLBS	3316do	
0000 0015	vl	Cambodia, National Radio Of	11940as
0000 0015		Japan, Radio	13650as
0000 0030		Egypt, Radio Cairo	11725na
0000 0030		Thailand, Radio	9680af
0000 0030		UK, BBC World Service	3915as 11945as
0000 0030		USA, Voice of America	7215va 9890va
		11760va 15185va	15290va 17740va
0000 0045		India, All India Radio	9705as 9950as
		11620as 11645as	13605as
0000 0055		Netherlands, Radio	9845na
0000 0057		Canada, Radio Canada Intl	5960na 9590na
0000 0100		Anguilla, Caribbean Beacon	6090am
0000 0100		Australia, ABC NT Alice Springs	2310irr 4835do
0000 0100		Australia, ABC NT Katherine	5025do
0000 0100		Australia, ABC NT Tenant Creek	4910do
0000 0100		Australia, Radio	9660pa 13630pa
		15240pa 15415as	17750as 17775va
0000 0100		Bulgaria, Radio	7400na
0000 0100		Canada, CBC Northern Service	9625do
0000 0100		Canada, CFRX Toronto ON	6070do
0000 0100		Canada, CFVP Calgary AB	6030do
0000 0100		Canada, CKZN St John's NF	6160do
0000 0100		Canada, CKZU Vancouver BC	6160do
0000 0100		Costa Rica, University Network	5030am 6150am
		7375am 9725sa	11870am 13750na
0000 0100	1st a/month	Finland, Scandinavian Weekend Radio	5990eu
		11690eu	
0000 0100		Germany, Deutsche Welle	7290as 9880as
0000 0100		Guyana, Voice of	3291do
0000 0100		Japan, Radio	6145na
0000 0100		Malaysia, RTM Radio 4	7295do
0000 0100		Namibia, Namibian BC Corp	3270af 3290af
0000 0100		6060af	
0000 0100		New Zealand, Radio NZ Intl	17675pa
0000 0100		Sierra Leone, Radio UNAMSIL	6139af
0000 0100		Singapore, Mediacorp Radio	6150do
0000 0100	vl	Solomon Islands, SIBC	5020do 9545do
0000 0100		Spain, Radio Exterior Espana	6055am
0000 0100		UK, BBC World Service	5970as 5975ca
		6195as 9410as 9740as	9825sa 11955as
		12095as 15280as	15310as 15360as
0000 0100		USA, Armed Forces Radio	4319usb 5446usb
		5765usb 6350usb	7507usb 10320usb
		12133usb 12579usb	13362usb 13855usb
0000 0100		USA, KAIJ Dallas TX	13815va
0000 0100		USA, KTBN Salt Lake City UT	7505na
0000 0100		USA, KWHR Naalehu HI	17510as
0000 0100	twhfa	USA, Voice of America	5995am 6130am
		7405am 9455am	9775am 11695am
0000 0100	mtwhfa	USA, WBCQ Kennebunk ME	7415na 9330na
0000 0100		USA, WBCQ Kennebunk ME	5105na
0000 0100		USA, WBOH Newport NC	5920am
0000 0100		USA, WEWN Birmingham AL	5825va
0000 0100		USA, WHRA Greenbush ME	7580va
0000 0100		USA, WHRI Noblesville IN	5745va 7315am
0000 0100		USA, WINB Red Lion PA	9320am
0000 0100		USA, WJIE Louisville KY	13595am
0000 0100	sm	USA, WRMI Miami FL	9955am
0000 0100	twhfa	USA, WRMI Miami FL	7385na
0000 0100	mwfas	USA, WSHB Cypress Creek SC	7535am
0000 0100	mwf	USA, WSHB Cypress Creek SC	9430am
0000 0100	sm	USA, WTJC Newport NC	9370na
0000 0100		USA, WWBS Macon GA	1190na
0000 0100		USA, WWCR Nashville TN	5935na 7465na
		5935na 6890na	3210na 5070na
0000 0100		USA, WWRB Manchester TN	5050na 5085na
		6890na	1000 0200
0000 0100		USA, WYFR Okeechobee FL	6085na 9505na
		11720sa	
0000 0100	vl	Vanuatu, Radio	3945al
0000 0100		Zambia, Christian Voice	4965do
0015 0030	twhfa	Austria, Radio Austria Intl	13730sa
0030 0100	mtwhfa	Germany, Bible Voice Broadcasting	7105as
0030 0100		Iran, Voice of the Islamic Rep	6120am 9580am
0030 0100		Lithuania, Radio Vilnius	6120al 7325na
0030 0100		Sri Lanka, SLBC	6005as 9770as
0030 0100		Thailand, Radio	13695na 15745as
0030 0100		UK, BBC World Service	9580as
0045 0100	twhfa	Austria, Radio Austria Intl	13730sa
0055 0100		Italy, RAI Intl	9675na 11800na
		11940as	
		17810as	
		17820va	
		17825as	
		17845as	
		17850va	
		17870am	
		17875na	
		17880va	
		17885pa	
		17890as	
		17895as	
		17900na	
		17910as	
		17925sa	
		17930na	
		17940na	
		17950na	
		17960na	
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		17980na	
		17990na	
		18000na	
		18010na	
		18020na	
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		18120na	
		18130na	
		18140na	
		18150na	
		18160na	
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		18180na	
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		18310na	
		18320na	
		18330na	
		18340na	
		18350na	
		18360na	
		18370na	
		18380na	
		18390na	
		18400na	
		18410na	
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		18450na	
		18460na	
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		18480na	
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		18500na	
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		18680na	
		18690na	
		18700na	
		18710na	
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		18800na	
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		18980na	
		18990na	
		19000na	
		19010na	
		19020na	
		19030na	
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		19160na	
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		19210na	
		19220na	
		19230na	
		19240na	
		19250na	
		19260na	
		19270na	
		19280na	
		19290na	
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		19310na	
		19320na	
		19330na	
		19340na	
		19350na	
		19360na	
		19370na	
		19380na	
		19390na	
		19400na	
		19410na	
		19420na	
		19430na	
		19440na	
		19450na	
		19460na	
		19470na	
		19480na	
		19490na	
		19500na	
		19510na	
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		19690na	
		19700na	
		19710na	
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		19930na	
		19940na	
		19950na	
		19960na	
		19970na	
		19980na	
		19990na	
		20000na	
		20010na	
		20020na	
		20030na	
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		20200na	
		20210na	
		20220na	
		20230na	
		20240na	
		20250na	
		20260na	
		20270na	
		20280na	
		20290na	
		20300na	
		20310na	
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		20330na	
		20340na	
		20350na	
		20360na	
		20370na	
		20380na	
		20390na	
		20400na	
		20410na	
		20420na	
		20430na	
		20440na	
		20450na	
		20460na	
		20470na	
		20480na	
		20490na	
		20500na	

Shortwave Guide



0200 UTC - 9PM EST / 8PM CST / 6PM PST

0200	0227	Czech Rep, Radio Prague Intl	6200na	7345na
0200	0228	Hungary, Radio Budapest	9835na	
0200	0230	Iran, Voice of the Islamic Rep	6120na	9580na
0200	0230	Serbia & Montenegro, Intl Radio	7130na	
0200	0230	USA, KJES Vado NM	7555na	
0200	0256	North Korea, Voice of	4405as	9325as
0200	0256	South Korea, Radio Korea Intl	9560na	11810sa
0200	0259	Canada, Radio Canada Intl	6040am	9755am
0200	0300	Anguilla, Caribbean Beacon	11725am	15150as
0200	0300	Argentina, RAE	1710am	6090am
0200	0300	Australia, ABC NT Alice Springs	2310irr	4835do
0200	0300	Australia, ABC NT Katherine	5025do	
0200	0300	Australia, ABC NT Tennant Creek	4910do	
0200	0300	Australia, HCJB	15555pa	
0200	0300	Australia, Radio	9660pa	12080va
0200	0300	15240pa	15415as	13630pa
0200	0300	21725as	15515va	17750as
0200	0300	Austria, AWR Europe	7230as	
0200	0300	Canada, CBC Northern Service	9625do	
0200	0300	Canada, CFRX Toronto ON	6070do	
0200	0300	Canada, CFVP Calgary AB	6030do	
0200	0300	Canada, CKZN St John's NF	6160do	
0200	0300	Canada, CKZU Vancouver BC	6160do	
0200	0300	Costa Rica, University Network	5030am	6150am
		7375am	9725sa	11870am
0200	0300	Cuba, Radio Havana	6000na	9820na
0200	0300	Egypt, Radio Cairo	11780na	
0200	0300	Finland, Scandinavian Weekend	5980eu	11720eu
0200	0300	Germany, Bible Voice Broadcasting	17540as	
0200	0300	Guyana, Voice of	3291do	5950do
0200	0300	Indonesia, Voice of	9525as	11785as
0200	0300	Malaysia, RTM Radio 4	7295do	
0200	0300	Myanmar, Radio	7185do	
0200	0300	Namibia, Namibian BC Corp	6090af	3270af
0200	0300	New Zealand, Radio NZ Intl	17675pa	
0200	0300	Philippines, Radio Pilipinas	12015me	15270me
0200	0300	Russia, Voice of	5995me	6155na
		9765na	15445na	15445na
0200	0300	Sierra Leone, Radio UNAMSIL	6139af	
0200	0300	Singapore, Mediacorp Radio	6150do	
0200	0300	Solomon Islands, SIBC	5020do	9545do
0200	0300	Sri Lanka, SLBC	6005as	5020do
0200	0300	Taiwan, Radio Taiwan Intl	11875as	6005af
		11875as	15320as	9750am
0200	0300	UK, BBC World Service	5975ca	15410af
		9410me	9525ca	15410af
		11955as	9750af	15410af
		12095sa	9825sa	15575me
		15360as	15280as	15575me
0200	0300	USA, Armed Forces Radio	4319usb	17790as
		5765usb	6350usb	17790as
		12133usb	12579usb	17790as
0200	0300	USA, KAIJ Dallas TX	5755va	
0200	0300	USA, KTBN Salt Lake City UT	7505na	
0200	0300	USA, KWHR Naalehu HI	17510as	
0200	0300	USA, Voice of America	7200va	
		9850va	11705va	
		15250va	15290va	
0200	0300	USA, WBCQ Kennebunk ME	5105na	
0200	0300	USA, WBOH Newport NC	5920am	
0200	0300	USA, WEWN Birmingham AL	5825va	
0200	0300	USA, WHRA Greenbush ME	7580va	
0200	0300	USA, WHRI Noblesville IN	5745va	7315am
0200	0300	USA, WINB Red Lion PA	9320am	
0200	0300	USA, WJIE Louisville KY	13595am	
0200	0300	USA, WRMJ Miami FL	7385na	
0200	0300	USA, WSHB Cypress Creek SC	7535na	
0200	0300	USA, WSHB Cypress Creek SC	9430ca	
0200	0300	USA, WTJC Newport NC	9370na	
0200	0300	USA, WWCR Nashville TN	3210na	5070na
		5935na	7465na	5935na
0200	0300	USA, WWRB Manchester TN	5050na	5085na
		6890na	6890na	6890na
0200	0300	USA, WYFR Okeechobee FL	5985na	6065na
		9505na	9985sa	11740sa
0200	0300	Vanuatu, Radio	11855ca	11740sa
0200	0300	Zambia, Christian Voice	7260do	
0215	0220	Nepal, Radio	4965do	
		3230as	5005as	6100as
		7164as		
0230	0257	Vietnam, Voice of	6175na	
0230	0300	Sweden, Radio	9495na	
0245	0300	Albania, Radio Tirana Intl	6115na	7160na
0245	0300	UK, BBC World Service	9610af	
0250	0300	Vatican City, Vatican Radio	7305am	9605am
0250	0300	Zambia, Radio	4910do	

0300 UTC - 10PM EST / 9PM CST / 7PM PST

0300	0310	Vatican City, Vatican Radio	7305am	9605am
0300	0315	Croatia, Voice of	7285na	
0300	0330	Australia, HCJB	15555pa	
0300	0330	Belarus, Radio Belarus Intl		5970eu
0300	0330	Egypt, Radio Cairo	11780na	7210eu
0300	0330	Philippines, Radio Pilipinas	15270me	15120me
0300	0330	Thailand, Radio	15460na	
0300	0330	UK, Wales Radio	19735na	
0300	0330	USA, KJES Vado NM		7555na
0300	0335	South Africa, Channel Africa	3345af	9770af
0300	0336	China, China Radio Intl	9690na	9790na
0300	0336	North Korea, Voice of	3560as	6195as
0300	0336	7140as9345as		
0300	0336	Romania, Radio Romania Intl	6040na	9515na
0300	0338	New Zealand, Radio NZ Intl	17675pa	
0300	0400	Anguilla, Caribbean Beacon	6090am	
0300	0400	Australia, ABC NT Alice Springs	2310irr	4835do
0300	0400	Australia, ABC NT Katherine	5025do	
0300	0400	Australia, ABC NT Tennant Creek	4910do	
0300	0400	Australia, Radio	9660pa	12080va
0300	0400	15240pa	15415as	13630pa
0300	0400	21725as	17750as	17750as
0300	0400	Botswana, Radio	4820do	4830al
0300	0400	Bulgaria, Radio	7400na	9400na
0300	0400	Canada, CBC Northern Service	9625do	
0300	0400	Canada, CFRX Toronto ON	6070do	
0300	0400	Canada, CFVP Calgary AB	6030do	
0300	0400	Canada, CKZN St John's NF	6160do	
0300	0400	Canada, CKZU Vancouver BC	6160do	
0300	0400	Costa Rica, University Network	5030am	6150am
		7375am	9725sa	11870am
0300	0400	Cuba, Radio Havana	6000na	9820na
0300	0400	Finland, Scandinavian Weekend	5980eu	5980eu
0300	0400	11720eu		
0300	0400	Guyana, Voice of	3291do	5950do
0300	0400	Japan, Radio	21610pa	
0300	0400	Malaysia, RTM Radio 4	7295do	
0300	0400	Namibia, Namibian BC Corp	6090af	3270af
0300	0400	Oman, Radio	15355af	
0300	0400	Russia, Voice of	6155na	7180na
0300	0400	15445na	15595na	7180na
0300	0400	Sierra Leone, Radio UNAMSIL	6139af	
0300	0400	Singapore, Mediaborg Radio	6150do	
0300	0400	Solomon Islands, SIBC	5020do	9545do
0300	0400	Sri Lanka, SLBC	6005as	5020do
0300	0400	Taiwan, Radio Taiwan Intl	11875as	9550na
0300	0400	11875as	15125sa	9550na
0300	0400	Uganda, Radio	4976do	7196do
0300	0400	UK, BBC World Service	6005af	3255af
0300	0400	6190af	6195eu	7160af
0300	0400	9525am	9750af	11760me
0300	0400	12035af	15280as	15310as
0300	0400	15410af	15575me	15360as
0300	0400	21660as	21660as	17790as
0300	0400	USA, Armed Forces Radio	4319usb	5446usb
0300	0400	5765usb	6350usb	5446usb
0300	0400	12133usb	12579usb	5446usb
0300	0400	12579usb	13855usb	5446usb
0300	0400	USA, KAIJ Dallas TX	5755va	
0300	0400	USA, KTBN Salt Lake City UT	7505na	
0300	0400	USA, KWHR Naalehu HI	17510as	
0300	0400	USA, Voice of America	4960af	6035af
0300	0400	6080af	7265af	7340af
0300	0400	7290af	7985af	7415af
0300	0400	9575af	9885af	9330na
0300	0400	USA, WBCQ Kennebunk ME	7415na	
0300	0400	USA, WBCQ Kennebunk ME	5105na	
0300	0400	USA, WBOH Newport NC	5920am	
0300	0400	USA, WEWN Birmingham AL	5825va	
0300	0400	USA, WHRA Greenbush ME	7580va	
0300	0400	USA, WHRI Noblesville IN	5745va	7315am
0300	0400	USA, WINB Red Lion PA	9320am	
0300	0400	USA, WJIE Louisville KY	13595am	
0300	0400	USA, WRMJ Miami FL	7385na	
0300	0400	USA, WSHB Cypress Creek SC	5850eu	
0300	0400	USA, WSHB Cypress Creek SC	9370na	
0300	0400	USA, WWCR Nashville TN	3210na	
0300	0400	5935na	7465na	5935na
0300	0400	USA, WWCR Manchester TN	5050na	5085na
0300	0400	6890na	6890na	6890na
0300	0400	USA, WYFR Okeechobee FL	6065na	
0300	0400	9505na	9985sa	11740sa
0300	0400	Vanuatu, Radio	11855ca	11740sa
0300	0400	Zambia, Radio	4910do	
0300	0400	Christian Voice	4965do	
0300	0400	Nepal, Radio	5005as	
0300	0400	7160as		
0300	0400	Vietnam, Voice of	6175na	
0300	0400	Hungary, Radio Budapest	9835na	
0300	0400	Albania, Radio Tirana Intl	6165eu	
0300	0400	Malaysia, Radio Malaysia Kota Kinabalu	5979do	
0300	0400	Sweden, Radio	9495na	
0300	0400	UAE, Radio Dubai	12005na	15400na
0300	0400	17890na		
0300	0400	UK, BBC World Service	7130eu	7265eu
0345	0400	9670eu		
0345	0400	Tajikistan, Tajik Radio	7245as	

Shortwave Guide

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0400 UTC - 11PM EST / 10PM CST / 8PM PST

0400 0427	Czech Rep, Radio Prague Intl	6200na	7345na	0500 0530	France, Radio France Intl	11850af	13610af
0400 0430	France, Radio France Intl	9805af	11995af	0500 0530	Netherlands, Radio 15255va	5960af	6015af
0400 0430	South Africa, Channel Africa	3345af		0500 0530	South Africa, AWR Africa	15280as	17885af
0400 0430	Sri Lanka, SLBC	6005as	9770as	0500 0530	UK, BBC World Service	7295eu	9670eu
0400 0450	Turkey, Voice of	6020va	7240eu	0500 0530	UK, BBC World Service	11845eu	
0400 0455	Netherlands, Radio	6165na	9590na	0500 0556	Vatican City, Vatican Radio	7360af	9660af
0400 0456	China, China Radio Intl	6190na	9560na	0500 0600	China, China Radio Intl	6190na	9560na
	9755na			0500 0600	Anguilla, Caribbean Beacon	6090am	
0400 0500	Anguilla, Caribbean Beacon	6090am		0500 0600	Australia, ABC NT Alice Springs	2310irr	4835do
0400 0500	Australia, ABC NT Alice Springs	2310irr	4835do	0500 0600	Australia, ABC NT Katherine	5025do	
0400 0500	Australia, ABC NT Katherine	5025do		0500 0600	Australia, ABC NT Tenant Creek	4910da	
0400 0500	Australia, ABC NT Tenant Creek	4910da		0500 0600	Australia, Radio	9660pa	13630pa
0400 0500	Australia, Radio	9660pa	12080va	0500 0600	15160as	15240pa	17750as
	15240pa	15415as	17750as	0500 0600	Bhutan, Bhutan BC Service	5030al	6035do
0400 0500	21725as			0500 0600	Botswana, Radio	4820do	4830al
0400 0500	Botswana, Radio	4820do	4830al	0500 0600	Canada, CBC Northern Service	9625do	
0400 0500	Canada, CBC Northern Service	9625do		0500 0600	Canada, CFRX Toronto ON	6070da	
0400 0500	Canada, CFRX Toronto ON	6070do		0500 0600	Canada, CKZN St John's NF	6160do	
0400 0500	Canada, CKZN St John's NF	6160do		0500 0600	Canada, CKZU Vancouver BC	6160do	
0400 0500	Canada, CKZU Vancouver BC	6160do		0500 0600	Costa Rica, University Network	5030am	6150am
0400 0500	Costa Rica, University Network	5030am	6150am	0500 0600	7375am	9725sa	11870am
	7375am	9725sa	11870am	0500 0600	Cuba, Radio Havana	9550am	9820na
0400 0500	Cuba, Radio Havana	6000na	9820na	0500 0600	11760na		
0400 0500	Finland, Scandinavian Weekend	5980eu		0500 0600	Finland, Scandinavian Weekend	11720eu	6170eu
0400 0500	11720eu			0500 0600	Finland, Scandinavian Weekend	11690eu	6170va
0400 0500	Germany, Deutsche Welle	6180af	9545af	0500 0600	Germany, Deutsche Welle	12045af	9565af
	9710af			0500 0600	Greece, Voice of	15410af	11805af
0400 0500	Germany, Overcomer Ministries	9770au		0500 0600	Greece, Voice of	9420eu	12105eu
0400 0500	Guyana, Voice of	3291do	5950do	0500 0600	Guyana, Voice of	3291do	5950do
0400 0500	Malaysia, Radio Malaysia Kota	Kinabalu	5979do	0500 0600	Japan, Radio	5975eu	6110na
0400 0500	Malaysia, RTM Radio 4	7295do		0500 0600	11715eu	11760as	7230eu
0400 0500	Namibia, Namibian BC Corp	3270af	3290af	0500 0600	21755pa	15195as	17810as
0400 0500	New Zealand, Radio NZ Intl	15340pa		0500 0600	Kuwait, Radio	15110as	
0400 0500	Russia, Voice of	7125na	7180na	0500 0600	Malaysia, Radio Malaysia Kota	Kinabalu	5979do
	7350na	12010na	15445na	0500 0600	Malaysia, RTM Radio 4	7295do	
0400 0500	Sierra Leone, Radio UNAMSIL	6139af		0500 0600	Namibia, Namibian BC Corp	6060af	6175al
0400 0500	Singapore, Medicorp Radio	6150do		0500 0600	New Zealand, Radio NZ Intl	15340pa	
0400 0500	Solomon Islands, SIBC	5020do	9545do	0500 0600	Nigeria, Radio/Enugu	6025do	
0400 0500	Uganda, Radio	4976do	5026do	0500 0600	Nigeria, Radio/Ibadan	6050do	
0400 0500	UK, BBC World Service	6005af	6135ca	0500 0600	Nigeria, Radio/Lagos	4770do	6090do
	6190af	6190af	6195eu	0500 0600	Nigeria, Voice of	17800af	
0400 0500	6005af	6135ca	6195eu	0500 0600	Russia, Voice of	7125na	7240na
	9410eu	11760me	11765af	0500 0600	12010na	15445na	7180na
0400 0500	15280as	15310as	12035af	0500 0600	Sierra Leone, Radio UNAMSIL	15959na	
	15575me	17760as	15360as	0500 0600	Singapore, Medicorp Radio	6139af	
0400 0500	USA, KAIJ Dallas TX	5755va	7790as	0500 0600	Solomon Islands, SIBC	5020do	9545do
0400 0500	USA, KTBN Salt Lake City UT	7505na		0500 0600	South Africa, Channel Africa	9525af	11710af
0400 0500	USA, KWHR Naalehu HI	17780as		0500 0600	Swaziland, TWR	6120af	9500af
0400 0500	USA, Voice of America	4960af	6080af	0500 0600	Uganda, Radio	4976do	7196do
	7170va	7290af	7415af	0500 0600	UK, BBC World Service	6005af	6135ca
0400 0500	9575af	9885af	15205va	0500 0600	6190af	6195eu	9410eu
0400 0500	USA, WBCQ Kennebunk ME	5105na	7415na	0500 0600	11765af	11940af	11760me
	9330na			0500 0600	15360as	15420af	15556eu
0400 0500	USA, WBOH Newport NC	5920am		0500 0600	177640af	17760as	15575me
0400 0500	USA, WEWN Birmingham AL	5825na		0500 0600	USA, Armed Forces Radio	4319us	5446usb
0400 0500	USA, WHRA Greenbush ME	7580va		0500 0600	5765us	6350usb	10320usb
0400 0500	USA, WHRI Noblesville IN	5745va	7315am	0500 0600	12133us	12579usb	13855usb
0400 0500	USA, WINB Red Lion PA	9320am		0500 0600	USA, KAIJ Dallas TX	5755va	
0400 0500	USA, WJIE Louisville KY	13595am		0500 0600	USA, KTBN Salt Lake City UT	7505na	
0400 0500	USA, WMLK Bethel PA	9465eu		0500 0600	USA, KWHR Naalehu HI	17780as	
0400 0500	USA, WRLM Miami FL	7385na		0500 0600	USA, Voice of America	6035af	6080af
0400 0500	USA, WSHB Cypress Creek SC	12020va		0500 0600	6105af	7295af	9700va
0400 0500	USA, WTJC Newport NC	9370na		0500 0600	11835af	13710af	11825va
0400 0500	USA, WWCR Nashville TN	3210na	5070na	0500 0600	USA, WBCQ Kennebunk ME	7415na	
	5935na	7465na	5085na	0500 0600	USA, WBCQ Kennebunk ME	9330na	
0400 0500	USA, WWRB Manchester TN	6890na		0500 0600	USA, WBCQ Kennebunk ME	5105na	
0400 0500	USA, WYFR Okeechobee FL	6065na	6855va	0500 0600	USA, WBOH Newport NC	5920am	
	7355va	9505na		0500 0600	USA, WEWN Birmingham AL	5825na	7570va
0400 0500	Vanuatu, Radio	3945al	7260do	0500 0600	USA, WHRA Greenbush ME	7580af	
0400 0500	Zambia, Radio	4910do		0500 0600	USA, WHRI Noblesville IN	5745va	7315am
0400 0500	Zambia, Radio Christian Voice	6065do		0500 0600	USA, WJIE Louisville KY	13595am	
0400 0500	Zimbabwe, ZBC Corp	5975do		0500 0600	USA, WMLK Bethel PA	9465eu	
0415 0420	Kyrgyzstan, Radio Kyrgyzstan	4010as	4795as	0500 0600	USA, WRLM Miami FL	7385na	
0430 0457	Czech Rep, Radio Prague Intl	9865va	11600va	0500 0600	USA, WSHB Cypress Creek SC	7535eu	
0430 0500	Austria, AWR Europe	9875me		0500 0600	USA, WTJC Newport NC	9370na	
0430 0500	Nigeria, Radio/Enugu	6025do		0500 0600	USA, WWCR Nashville TN	3210na	5070na
0430 0500	Nigeria, Radio/Ibadan	6050do		0500 0600	5935na	7560na	
0430 0500	Nigeria, Radio/Kaduna	4770do	6090do	0500 0600	USA, WWRB Manchester TN	5050na	5085na
0430 0500	Nigeria, Radio/Lagos	3326do	4990do	0500 0600	6890na		
0445 0500	Swaziland, TWR	4775af	6120af	0500 0600	USA, WYFR Okeechobee FL	6855eu	7520eu
	Italy, RAI Intl	5965af	6100af	0500 0600	Vanuatu, Radio	3945al	
0500 0515	Israel, Kol Israel	9435va	11605va	0500 0600	7260do		
0500 0529	Belgium, Radio Vlaanderen	9590na	17600va	0500 0600	Zambia, Radio Christian Voice	6065do	
				0500 0600	Zimbabwe, ZBC Corp	5975do	
				0515 0525	Rwanda, Radio	6005do	
				0525 0600	Ghana, Ghana BC Corp	3366do	
				0530 0545	UK, BBC World Service	6010eu	
				0530 0550	UAE, Radio Dubai	15435au	
				0530 0600	Thailand, Radio	13780eu	

0500 UTC - 12AM EST / 11PM CST / 9PM PST

0500 0515	Israel, Kol Israel	9435va	11605va	0530 0600	France, Radio France Intl	11905me
0500 0529	Belgium, Radio Vlaanderen	9590na	17600va	0530 0600	South Africa, AWR Africa	15345af

Shortwave Guide

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0530	0600	mtwhf	UK, BBC World Service	17885af	Austria, Radio Austria Intl
					17870me
0600 UTC - 1AM EST / 12AM CST / 10PM PST					
0600	0615	South Africa, TWR 11640af	0700	0715	Croatia, Voice of 9470pa
0600	0620	Vatican City, Vatican Radio 7250eu	0700	0726	Romania, Radio Romania Intl
0600	0630	France, Radio France Intl 17800af	0700	0727	Slovakia, Radio Slovakia Intl 17550au
0600	0630	South Africa, AWR Africa 15345af	0700	0730	Tibet, Xizang PBS 9490as
0600	0630	Swaziland, TWR 6120af	0700	0730	UK, BBC World Service 17885af
0600	0700	Anguilla, Caribbean Beacon 6090am	0700	0745	USA, WYFR Okeechobee FL 7355eu
0600	0700	Australia, ABC NT Alice Springs 2310irr	0700	0759	New Zealand, Radio NZ Intl 15340pa
0600	0700	Australia, ABC NT Katherine 5025do	0700	0800	Anguilla, Caribbean Beacon 6090am
0600	0700	Australia, ABC NT Tennant Creek 4910do	0700	0800	Australia, ABC NT Alice Springs 2310irr
0600	0700	Australia, Radio 9660pa	0700	0800	Australia, ABC NT Katherine 5025do
0600	0700	15160as 15240pa	0700	0800	Australia, ABC NT Tennant Creek 4910do
0600	0700	Botswana, Radio 4820do	0700	0800	Australia, Radio 9660pa
0600	0700	Canada, CFRX Toronto ON 6070do	0700	0800	13630pa 15160as
0600	0700	Canada, CFVP Calgary AB 6030do	0700	0800	15240al 17750as
0600	0700	Canada, CKZN St John's NF 6160do	0700	0800	Botswana, Radio 4820do
0600	0700	Canada, CKZU Vancouver BC 6160do	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	Costa Rica, University Network 5030am	0700	0800	Canada, CFVP Calgary AB 6030do
		7375am 9725sa	0700	0800	Canada, CKZN St John's NF 6160do
		11870am 13750na	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	Cuba, Radio Havana 9550am	0700	0800	Costa Rica, University Network 5030am
0600	0700	11760na	0700	0800	7375am 9725sa
0600	0700	1st a/month Finland, Scandinavian Weekend 11690eu	0700	0800	11880pa 12080va
0600	0700	Georgia, Radio Georgia 11805eu	0700	0800	12080va 12750as
0600	0700	Germany, Deutsche Welle 6140eu	0700	0800	Botswana, Radio 4820do
0600	0700	11785af 15410af	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	Germany, Deutsche Welle 21675af	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	vl Ghana, Ghana BC Corp 3366do	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	Ghana, Ghana BC Corp 4915do	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	Guyana, Voice of 3291do	0700	0800	Costa Rica, University Network 5030am
0600	0700	Japan, Radio 5950do	0700	0800	6150am 61750na
0600	0700	Japan, Radio 7230eu	0700	0800	11870am 13750na
0600	0700	15195as 17870pa	0700	0800	13630pa 15160as
0600	0700	21755pa	0700	0800	15240al 17750as
0600	0700	DRM Kuwait, Radio 15110as	0700	0800	Botswana, Radio 4820do
0600	0700	Kuwait, Radio 15110as	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	Liberia, ELWA 4760do	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	Malaysia, RTM Radio 4 7295do	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	Malaysia, Voice of 6175as 9665as	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	15295au	0700	0800	Costa Rica, University Network 5030am
0600	0700	Namibia, Namibian BC Corp 6060af	0700	0800	6150am 61750na
0600	0700	New Zealand, Radio NZ Intl 15340pa	0700	0800	11880pa 12080va
0600	0700	Nigeria, Radio/Enugu 6025do	0700	0800	12080va 12750as
0600	0700	Nigeria, Radio/Ibadan 6050do	0700	0800	Botswana, Radio 4820do
0600	0700	Nigeria, Radio/Kaduna 4770do	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	Nigeria, Radio/Lagos 3326do	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	Nigeria, Voice of 17800af	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	Papua New Guinea, NBC 4890do	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	Russia, Voice of 21790pa	0700	0800	Costa Rica, University Network 5030am
0600	0700	Sierra Leone, Radio UNAMISIL 6139af	0700	0800	6150am 61750na
0600	0700	Singapore, Mediacion Radio 6150do	0700	0800	11880pa 12080va
0600	0700	vl Solomon Islands, SIBC 5020do	0700	0800	12080va 12750as
0600	0700	South Africa, Channel Africa 9525af	0700	0800	Botswana, Radio 4820do
0600	0700	Swaziland, TWR 7205af	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	UK, BBC World Service 17885af	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	UK, BBC World Service 6195eu	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	7160af 9410eu	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	11940af 12095eu	0700	0800	Costa Rica, University Network 5030am
0600	0700	15360as 15400af	0700	0800	6150am 61750na
0600	0700	17640af 17760as	0700	0800	11880pa 12080va
0600	0700	USA, Armed Forces Radio 4319usb	0700	0800	12080va 12750as
0600	0700	5765usb 6350usb	0700	0800	Botswana, Radio 4820do
0600	0700	12133usb 12579usb	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	USA, Armed Forces Radio 5446usb	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	5765usb 6350usb	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	12133usb 12579usb	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	USA, KAJI Dallas TX 5755va	0700	0800	Costa Rica, University Network 5030am
0600	0700	USA, KTBN Salt Lake City UT 7505na	0700	0800	6150am 61750na
0600	0700	USA, KWHR Naalehu HI 17780as	0700	0800	11880pa 12080va
0600	0700	USA, Voice of America 5995va	0700	0800	12080va 12750as
0600	0700	6080af 6105af 7170va	0700	0800	Botswana, Radio 4820do
0600	0700	7295af 11825va	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	11835af 11930va	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	USA, WBCQ Kennebunk ME 5105na	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	USA, WBCQ Kennebunk ME 9330na	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	USA, WBOH Newport NC 5920am	0700	0800	Costa Rica, University Network 5030am
0600	0700	USA, WEWN Birmingham AL 5825na	0700	0800	6150am 61750na
0600	0700	USA, WHRA Greenbush ME 7580af	0700	0800	11880pa 12080va
0600	0700	USA, WHRI Noblesville IN 5745va	0700	0800	12080va 12750as
0600	0700	USA, WJIE Louisville KY 13595am	0700	0800	Botswana, Radio 4820do
0600	0700	USA, WRMI Miami FL 7385na	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	USA, WSHB Cypress Creek SC 7535af	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	USA, WTJC Newport NC 9370na	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	USA, WWCR Nashville TN 3210na	0700	0800	Canada, CKZU Vancouver BC 6160do
0600	0700	5935na 7560na	0700	0800	Costa Rica, University Network 5030am
0600	0700	USA, WWRB Manchester TN 5050na	0700	0800	6150am 61750na
0600	0700	6890na	0700	0800	11880pa 12080va
0600	0700	USA, WYFR Okeechobee FL 7355eu	0700	0800	12080va 12750as
0600	0700	11580eu	0700	0800	Botswana, Radio 4820do
0600	0700	vl Vanuatu, Radio 3945al	0700	0800	Canada, CFRX Toronto ON 6070do
0600	0700	9780me	0700	0800	Canada, CFVP Calgary AB 6030do
0600	0700	Zambia, Radio Christian Voice 9865do	0700	0800	Canada, CKZN St John's NF 6160do
0600	0700	Zimbabwe, ZBC Corp 5975do	0700	0800	Canada, CKZU Vancouver BC 6160do
0605	0630	as Austria, Radio Austria Intl 17870me	0700	0800	Costa Rica, University Network 5030am
0630	0645	as UK, BBC World Service 9875eu	0700	0800	6150am 61750na
0630	0700	Vatican City, Vatican Radio 9660af	0700	0800	11880pa 12080va
0630	0700	13765af	0700	0800	12080va 12750as
0630	2000	mtwha Germany, AWR Europe 9840eu	0700	0800	Botswana, Radio 4820do
0635	0700	s	0700	0800	Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
					12080va 12750as
					Botswana, Radio 4820do
					Canada, CFRX Toronto ON 6070do
					Canada, CFVP Calgary AB 6030do
					Canada, CKZN St John's NF 6160do
					Canada, CKZU Vancouver BC 6160do
					Costa Rica, University Network 5030am
					6150am 61750na
					11880pa 12080va
	</td				

Shortwave Guide

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0800 UTC - 3AM EST / 2AM CST / 12AM PST

0800	0804	Pakistan, Radio	17835eu	21465eu	
0800	0825	Malaysia, Voice of	6175as	9665as	9750as
		15295au			
0800	0827	Czech Rep, Radio	Prague Intl	7345eu	9880eu
0800	0829	Belgium, Radio	Vlaanderen Intl	5965eu	
0800	0830	Australia, ABC NT	Katherine	5025do	
0800	0830	Australia, ABC NT	Tennant Creek	4910do	
0800	0830	Malaysia, Radio	Malaysia Kota Kinabalu		5979do
0800	0830	Myanmar, Radio	9730da		
0800	0850	Monaco, TWR	9870eu		
0800	0900	Albania, TWR	12070eu		
0800	0900	Anguilla, Caribbean	Beacon	6090am	
0800	0900	Australia, ABC NT	Alice Springs	2310irr	4835dc
0800	0900	Australia, HCJB	11750pa		
0800	0900	Australia, Radio	5995na	9580va	9590as
		9710pa	12080va	13630as	15240v
		15415as			
0800	0900	mtwhf			
0800	0900	vl			
0800	0900	Bhutan, Bhutan BC	Service	5030al	6035dc
0800	0900	Botswana, Radio	4820da	4830al	7255dc
0800	0900	Canada, CFRX	Toronto ON	6070do	
0800	0900	Canada, CFVP	Calgary AB	6030do	
0800	0900	Canada, CKZN	St John's NF	6160do	
0800	0900	Canada, CKZU	Vancouver BC	6160do	
0800	0900	Costa Rica, University	Network	5030am	6150am
		7375am	9725sa	11870am	13750m
		17645as			
0800	0900	Eqt	Guinea, Radio Africa	15184af	
0800	0900	1st a/month	Finland, Scandinavian Weekend	Radio	6170eu
		11690eu			
0800	0900	Germany, Bible	Voice Broadcasting		5975eu
0800	0900	Germany, Deutsche	Welle	6140eu	
0800	0900	DRM	Germany, Deutsche Welle	15440af	21675dc
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915dc
0800	0900	as	Guam, TWR/KTWR	15205as	
0800	0900	mtwhf	Guam, TWR/KTWR	15330as	
0800	0900		Guam, TWR/KTWR	15205as	
0800	0900		Guyana, Voice of	3291da	5950do
0800	0900		Indonesia, Voice of	9525pa	15150as
0800	0900		Liberia, ELWA	4760do	
0800	0900	m-f/	Luxembourg, RTL Radio	Lutzeburg	6095eu
0800	0900	DRM	Malaysia, RTM Radio	4	7295do
0800	0900	mtwhfs	Monaco, TWR	9870eu	
0800	0900		New Zealand, Radio NZ	Intl	9885pa
0800	0900		Nigeria, Radio Enugu	6025do	
0800	0900		Nigeria, Radio/Ibadan	6050do	
0800	0900		Nigeria, Radio/Kaduna	4770do	6090dc
0800	0900		Nigeria, Radio/Lagos	3326do	4990dc
0800	0900		Nigeria, Voice of	17800af	
0800	0900		Papua New Guinea, NBC	4890do	9675irr
0800	0900		Russia, Voice of	17495pa	17665p
			21790pa		
0800	0900		Sierra Leone, Radio	UNAMSIL	6139af
0800	0900		Singapore, Medicorp	Radio	6150do
0800	0900	vl	Solomon Islands, SIBC		5020do
0800	0900	s	South Africa, Amateur	Radio League	9545dc
		17780af			9750af
0800	0900	a	South Africa, Radio	League	9750af
0800	0900		South Korea, Radio	Korea Intl	9570as
0800	0900		Swaziland, TWR	7205af	9500af
0800	0900		Taiwan, Radio	Taiwan Intl	9610au
0800	0900		UK, BBC World	Service	6190af
		11760me	11940af	11955as	9410eu
		15310as	15360as	15400af	12095eu
		15565eu	17640eu	17760as	15485eu
		17830af	17885af	21470af	17790eu
0800	0900as	UK, BBC	World Service	15575me	21660c
0800	0900	USA, Armed Forces	Radio	4319usb	5446us
		5765usb	6350usb	7507usb	10320c
		12133usb	12579usb	13362usb	13855c
0800	0900	USA, KNLS	Anchor Point AK	9795as	
0800	0900	USA, KTBN	Salt Lake City UT	7505na	
0800	0900	USA, KWHR	Naalehu HI	9930as	11565p
0800	0900	USA, WBOH	Newport NC	5920am	
0800	0900	USA, WEWN	Birmingham AL	5825na	
0800	0900	USA, WHRI	Noblesville IN	5745va	7315ar
0800	0900	USA, WJIE	Louisville KY	13595am	
0800	0900	USA, WMLK	Bethel PA	9465eu	
0800	0900	USA, WRMI	Miami FL	7385na	
0800	0900	USA, WSHB	Cypress Creek SC	7353eu	9845pa
0800	0900	USA, WTJC	Newport NC	9370na	
0800	0900	USA, WWCR	Nashville TN	3210na	5070na
		5935na	7560na		
0800	0900	USA, WYFR	Okeechobee FL	9985eu	
0800	0900	vl	Vanuatu, Radio	3945al	4960do
0800	0900		Zambia, Radio	Christian Voice	9865do
0815	0900	as	Guam, TWR/KTWR	15330as	
0830	0900		Australia, ABC NT	Katherine	2485do
0830	0900		Australia, ABC NT	Tennant Creek	2325do
0830	0900		Austria, AWR	Europe	9660af
0830	0900		Georgia, Radio	Georgia	11910eu
0830	0900		Switzerland, Swiss	Radio Intl	21770af
0840	0850		Turkmenistan, Turkmen	Radio	4930do

0900 UTC - 4AM EST / 3AM CST / 1AM PST

0900	0915	as	Germany, Bible Voice	Broadcasting	5975eu
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do
0900	0920	smtwhf	Albania, TWR	12070eu	
0900	0920	s	Monaco, TWR	9870eu	
0900	0930		Austria, AWR Europe	17670af	
0900	0930	mtwhf	Guam, TWR/KTWR	15330as	
0900	0930		Guam, TWR/KTWR	15330as	
0900	0930	as/vl	Italy, IRRS	13840va	
0900	0956		China, China Radio Intl	15210pa	17690pa
0900	1000		Anguilla, Caribbean Beacon	6090am	
0900	1000		Australia, ABC NT Alice Springs	2310do	4835irr
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Creek	2325do	
0900	1000		Australia, HCJB	11750pa	
0900	1000		Australia, Radio	9580va	9590as
			15240va	15415as	11880as
0900	1000		Australia, Voice Intl	11955as	
0900	1000	vl	Botswana, Radio	4820do	4830al
0900	1000		Canada, CFRX Toronto ON	6070do	
0900	1000		Canada, CFVP Calgary AB	6030do	
0900	1000		Canada, CKZN St John's NF	6160do	
0900	1000		Canada, CKZU Vancouver BC	6160do	
0900	1000		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	13750na
			17645as	11870am	
0900	1000		Eqt Guinea, Radio Africa	15184af	
0900	1000	1st a/month	Finland, Scandinavian Weekend	Radio	6170eu
			11690eu		
0900	1000	DRM	Germany, Deutsche Welle	17700af	
0900	1000		Germany, Deutsche Welle	6140eu	15440af
0900	1000	DRM	Germany, Deutsche Welle	21675af	
0900	1000		Guyana, Voice of	3291do	5950do
0900	1000	m-f/ DRM	Luxembourg, RTL Radio	Lutzeburg	6095eu
0900	1000		Malaysia, RTM Radio	4	7295do
0900	1000		New Zealand, Radio NZ	9885pa	
0900	1000		Nigeria, Radio Enugu	6025do	
0900	1000		Nigeria, Radio/Ibadan	6050do	
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do
0900	1000		Nigeria, Radio/Lagos	3326do	4990do
0900	1000		Nigeria, Voice of	17800af	
0900	1000		Palau, KHBN	15725as	
0900	1000		Papua New Guinea, NBC	4890do	9675irr
0900	1000		Russia, Voice of	17495pa	17665pa
0900	1000		Singapore, Mediacorp Radio	6150do	
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do
0900	1000	s	UAE, Radio UNMEE	21460af	
0900	1000		UK, BBC World Service	6190af	6195as
			9605as	9740as	11760me
			15190sa	15310as	11940af
			15485eu	15565eu	15360as
			17760as	17790as	15400af
			21470af	21660as	15575me
					17640eu
					17830af
					17885af
0900	1000		USA, Armed Forces	Radio	4319usb
			5765usb	6350usb	7507usb
			12133usb	12579usb	13362usb
0900	1000		USA, KTBN Salt Lake City	UT	7505na
0900	1000		USA, KWHR Naalehu HI		9930as
0900	1000		USA, WBOH Newport NC		5920am
0900	1000		USA, WEWN Birmingham AL		5825na
0900	1000		USA, WHRA Greenbush ME		7580af
0900	1000		USA, WHRI Noblesville IN		5745va
0900	1000		USA, WJIE Louisville KY		13595am
0900	1000		USA, WRMI Miami FL		7385na
0900	1000		USA, WTJC Newport NC		9370na
0900	1000		USA, WWCR Nashville TN		3210na
			5935na	7560na	5070na
0900	1000	vl	Vanuatu, Radio	3945al	4960do
0900	1000		Zambia, Radio Christian Voice		9865do
0910	0930	s	Armenia, Voice of	4810eu	15270as
0930	1000		Georgia, Radio Georgia		11910me
0930	1000		Greece, Voice of	9420eu	12105eu
0930	1000		Lithuania, Radio Vilnius		9710eu
0945	1000		Serbia, Montenegro, Intl	Radio	9850eu

1000 UTC - 5AM EST / 4AM CST / 2AM PST

1000	1027		Vietnam, Voice of	9840as	12020as
1000	1029		Czech Rep, Radio Prague Intl	21745va	
1000	1030		Germany, Deutsche Welle	6205as	15190as
			17820as		
1000	1030	DRM	Germany, Deutsche Welle	6140eu	15440eu
1000	1030		Guam, AWR/KSDA	11705as	
1000	1030		Mongolia, Voice of	12015as	
1000	1030		UK, BBC World Service	9605as	15360as
1000	1030	as	UK, BBC World Service	15190sa	15400af
			17830af		
1000	1030		UK, RTE Radio	15280au	
1000	1045		USA, KWHR Naalehu HI	9930as	11565pa
1000	1055		Netherlands, Radio	7315as	12065as
			12070pa	12080pa	13820as
1000	1055	DRM	Netherlands, Radio	9850pa	
1000	1056		China, China Radio Intl	15210pa	17690pa
1000	1056		North Korea, Voice of	3560as	9335am

Shortwave Guide



1000 1059		9850as 11709am 11735as			1100 1200	Canada, CFVP Calgary AB	6030do
1000 1100		New Zealand, Radio NZ Intl	9885pa		1100 1200	Canada, CKZN St John's NF	6160do
1000 1100		Anguilla, Caribbean Beacon	11775am		1100 1200	Canada, CKZU Vancouver BC	6160do
1000 1100		Australia, ABC NT Alice Springs	2310do	4835irr	1100 1200	Costa Rica, University Network	5030am
1000 1100		Australia, ABC NT Katherine	2485do			7375am 9725sa	11870am
1000 1100		Australia, ABC NT Tenant Creek	2325do			17645as	13750na
1000 1100		Australia, HCJB	11750pa			Ecuador, HCJB	21455va
1000 1100		Australia, Radio	9580va	9590as	1100 1200	Finland, Scandinavian Weekend	Radio
		15240va	15415as	11880as		11720eu	6170eu
1000 1100 as		Australia, Voice Intl	11955as	13685as	1100 1200	Germany, Deutsche Welle	17670as
1000 1100		Bhutan, Bhutan BC Service	5030al	6035do	1100 1200	Germany, Deutsche Welle	6140eu
1000 1100		Canada, CFRX Toronto ON	6070do		1100 1200	Germany, Deutsche Welle	17710af
1000 1100		Canada, CFVP Calgary AB	6030do		1100 1200	Germany, Overcomer Ministries	6110eu
1000 1100		Canada, CKZN St John's NF	6160do		1100 1200	Italy, IRRS	13840va
1000 1100		Canada, CKZU Vancouver BC	6160do		1100 1200	Japan, Radio	6120na
1000 1100		Costa Rica, University Network	5030am	6150am	1100 1200	Malaysia, RTM Radio 4	7295do
		7375am 9725sa	11870am	13750na	1100 1200	New Zealand, Radio NZ Intl	15530pa
		17645as			1100 1200	Papua New Guinea, NBC	4890do
1000 1100		Eqt Guinea, Radio Africa	15184af		1100 1200	Singapore, Radio Singapore Intl	6150as
1000 1100 1st a/month		Finland, Scandinavian Weekend	11720eu	6170eu	1100 1200	South Africa, Channel Africa	9525af
1000 1100 mtwhf		Germany, Deutsche Welle	17700va		1100 1200	South Africa, Radio Veritas	7240af
1000 1100		Guyana, Voice of	3291do	5949do	1100 1200	Taiwan, Radio Taiwan Intl	7445as
1000 1100		India, All India Radio	7270as	13710as	1100 1200	UK, BBC World Service	6190af
		15020as 15235as	15260as	17510au	9740as 11760me	11940af	6195va
1000 1100 as/vl		17800as 17895au			1100 1200	15310as 15485eu	12095eu
1000 1100		Italy, IRRS	13840va		1100 1200	15565eu	15190am
1000 1100		Japan, Radio	6120na	9695as	1100 1200	17640eu 17760as	15575me
		17585eu	21755pa	11730as	1100 1200	17885af 21470af	17790as
1000 1100 m-f/ DRM		Luxembourg, RTL Radio Lutzeburg	6095eu		1100 1200	USA, Armed Forces Radio	4319usb
1000 1100		Malaysia, RTM Radio 4	7295do		1100 1200	5765usb 6350usb	5446usb
1000 1100		Palau, KBN	15725as		1100 1200	12133usb 12579usb	10320usb
1000 1100		Papua New Guinea, NBC	4890do	9675irr	1100 1200	USA, KTBN Salt Lake City UT	13855usb
1000 1100		Singapore, Medicorp Radio	6150do		1100 1200	USA, KWHR Naalehu HI	7505na
1000 1100 vl		Solomon Islands, SIBC	5020do	9545do	1100 1200	USA, KWHR Naalehu HI	11565pa
1000 1100		South Africa, Radio Veritas	7240af		1100 1200	USA, WBOH Newport NC	9930as
1000 1100		UK, BBC World Service	6190af	6195va	1100 1200	USA, WEWN Birmingham AL	5920am
		9740as 11760me	12095eu	15190sa	1100 1200	USA, WHRI Noblesville IN	5825na
		15485eu 15565eu	15575me	17640eu	1100 1200	USA, WINB Red Lion PA	9495am
		17760as 17790as	17885af	21470af	1100 1200	USA, WJIE Louisville KY	9320am
1000 1100		USA, Armed Forces Radio	4319usb	5446usb	1100 1200	USA, WRMF Miami FL	13595am
		5765usb 6350usb	7507usb	10320usb	1100 1200	USA, WSHB Cypress Creek SC	9955am
		12133usb 12579usb	13362usb	13855usb	1100 1200	USA, WTJC Newport NC	6095am
1000 1100		USA, KTBN Salt Lake City UT	7505na		1100 1200	USA, WWCR Nashville TN	9370na
1000 1100		USA, WBOH Newport NC	5920am		1100 1200	7560na 15825na	5070na
1000 1100		USA, WEWN Birmingham AL	5825na		1100 1200	USA, WYFR Okeechobee FL	5950na
1000 1100		USA, WHRI Noblesville IN	9495am	9840na	1100 1200	9555na 11725sa	7355na
1000 1100		USA, WJIE Louisville KY	13595am		1100 1200	11830na	
1000 1100		USA, WRMF Miami FL	9955am		1100 1200	Zambia, Radio Christian Voice	9865do
1000 1100 a		USA, WSHB Cypress Creek SC	9455am		1100 1200	Israel, Kol Israel	15640va
1000 1100		USA, WTJC Newport NC	9370na		1100 1200	17545va	
1000 1100		USA, WWCR Nashville TN	7560na	9475na	1100 1200	Nepal, Radio	3230as
				5935na	1100 1200	7164as	5005as
1000 1100		USA, WYFR Okeechobee FL	5950na		1100 1200	Germany, Bible Voice Broadcasting	6100as
1000 1100 mtwhfa.vl		Vanuatu, Radio	3945al	4960do	1100 1200	Germany, BBC World Service	13590as
1000 1100		Zambia, Radio Christian Voice	9865do		1100 1200	115640va	11920as
1030 1045 mtwhf		Ethiopia, Radio	5990do	7110do	1100 1200	Czech Rep, Radio Prague Intl	21745va
1030 1100		Germany, Deutsche Welle	15440va	9704do	1100 1200	Belgium, Radio Vlaanderen Intl	9945as
1030 1100	DRM	Germany, Deutsche Welle	6140eu	15440eu	1100 1200	Iran, Voice of the Islamic Rep	6035na
1030 1100		Guam, AWR/KSDA	11900as		1100 1200	South Korea, Radio Korea Intl	9650na
1030 1100		Iran, Voice of the Islamic Rep	21470as	15550as	1100 1200	UK, Wales Radio Intl	17625au
1030 1100		UAE, Radio Dubai	13675eu	15480as	1100 1200	Vatican City, Vatican Radio	15595va
		21605eu		15435eu	1100 1200	Rwanda, Radio	17515va
1030 1100 t		UAE, Radio UNMEE	21550af	9605as	1100 1200	Germany, Bible Voice Broadcasting	13590as
1030 1100		UK, BBC World Service	15285as	21660as	1100 1200	Germany, BBC World Service	11640eu
1030 1100 as		UK, BBC World Service	15400af	17830af	1100 1200	11640eu	25820af
1030 1100 mt hfa		Vatican City, Vatican Radio	5890eu		1100 1200	Belgium, Radio Vlaanderen Intl	9835na
1045 1100		USA, KWHR Naalehu HI	9930as		1100 1200	Iran, Voice of the Islamic Rep	9945as
1045 1100 as		USA, KWHR Naalehu HI	11565pa		1100 1200	South Korea, Radio Korea Intl	9650na

1100 UTC - 6AM EST / 5AM CST / 3AM PST

1100 1104		Pakistan, Radio	17835eu	21465eu	1200 1215	Cambodia, National Radio Of	11940as
1100 1115	mtwhfa.vl	Vanuatu, Radio	3945al	4960do	1200 1230	France, Radio France Intl	17815af
1100 1127		Vietnam, Voice of	7285as		1200 1230	Iran, Voice of the Islamic Rep	6035na
1100 1130		Australia, HCJB	11750pa		1200 1230	South Korea, Radio Korea Intl	9650na
1100 1130 as		Bhutan, Bhutan BC Service	5030al	6035do	1200 1230	UAE, AWR Africa	15135as
1100 1130		Iran, Voice of the Islamic Rep	15550as	15480as	1200 1230	UK, BBC World Service	6195ca
1100 1130		Tajikistan, Tajik Radio	7245as		1200 1230	Uzbekistan, Radio Tashkent Intl	5060as
1100 1130		Tibet, Xizang PBS	4905as	4920as	1200 1255	Netherlands, Radio	6025as 9715as
1100 1130				6200as	1200 1255	5965na	9715as
1100 1130 t		UAE, Radio UNMEE	21550af		1200 1255	Netherlands, Radio	21780eu
1100 1130		UK, BBC World Service	15400af	6195ca	1200 1256	China, China Radio Intl	9730as
1100 1130 mtwhf		UK, BBC World Service	6195ca	15190ca	1200 1259	11760pa 11980as	9760pa
1100 1155	DRM	Netherlands, Radio	9850va		1200 1259	15415pa	
1100 1155		Anguilla, Caribbean Beacon	11775am		1200 1300	Canada, Radio Canada Intl	9795as
1100 1200		Australia, ABC NT Alice Springs	2310do	4835irr	1200 1300	New Zealand, Radio NZ Intl	11730as
1100 1200		Australia, ABC NT Katherine	2485do		1200 1300	Anguilla, Caribbean Beacon	15530pa
1100 1200		Australia, ABC NT Tenant Creek	2325do		1200 1300	Australia, ABC NT Alice Springs	11775am
1100 1200		Australia, Radio	5995pa	6020pa	1200 1300	Australia, ABC NT Katherine	2310do
1100 1200		9475as 9580va	5950as	6035va	1200 1300	Australia, ABC NT Tenant Creek	2485do
1100 1200		Australia, Voice Intl	13685as	11880as	1200 1300	Australia, Radio	6020pa
1100 1200		Canada, CFRX Toronto ON	6070do	15240va	1200 1300	9475as 9580va	11880as
					1200 1300	9590as	15240va
1100 1300					1200 1300	Australia, Voice Intl	13685as
1100 1300					1200 1300	13685as	9625do
1100 1300					1200 1300	Canada, CBC Northern Service	6070da
1100 1300					1200 1300	Canada, CFRX Toronto ON	6030do
1100 1300					1200 1300	Canada, CFVP Calgary AB	6030do
1100 1300					1200 1300	Canada, CKZN St John's NF	6160do
1100 1300					1200 1300	Canada, CKZU Vancouver BC	6160do
1100 1300					1200 1300	Costa Rica, University Network	5030am
1100 1300					1200 1300	7375am 9725sa	6150am
1100 1300					1200 1300	17645as	13750na
1100 1300					1200 1300	Ecuador, HCJB	21455va
1100 1300					1200 1300	Finland, Scandinavian Weekend	Radio
1100 1300					1200 1300	11720eu	6170eu
1100 1300					1200 1300	Germany, Deutsche Welle	9655eu
1100 1300					1200 1300	Germany, Overcomer Ministries	15440eu

Shortwave Guide

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1200	1300	as/vl	Italy, IRRS	13840va		1300	1400	USA, KWHR Naalehu HI	9930as	
1200	1300	m-f/ DRM	Luxembourg, RTL Radio Lutzeburg	6095eu		1300	1400	USA, Voice of America	6110va	
1200	1300		Malaysia, RTM Radio 4	7295do		1300	1400	11705va	15425va	
1200	1300		Papua New Guinea, NBC	4890do	9675irr	1300	1400	USA, WBCQ Kennebunk ME	17495na	
1200	1300		Singapore, Radio Singapore Intl	6150as	9600as	1300	1400	USA, WBOH Newport NC	5920am	
1200	1300		South Africa, Channel Africa	9525af		1300	1400	USA, WEWN Birmingham AL	9955na	
1200	1300		South Africa, Radio Veritas	7240af		1300	1400	USA, WHRA Greenbush ME	17560af	
1200	1300		Taiwan, Radio Taiwan Intl	7130as		1300	1400	USA, WHRI Noblesville IN	9840na	
1200	1300		UK, BBC World Service	6190af	6195as	1300	1400	USA, WINB Red Lion PA	9930am	
			9740as11760me	11940af	12095eu	1300	1400	USA, WJIE Louisville KY	13595am	
			15485eu	15565eu	15575me	1300	1400	USA, WRMI Miami FL	15725na	
			17760as	17790as	17830af	1300	1400	USA, WSHB Cypress Creek SC	9430na	
			21470af		17885af	1300	1400	USA, WSHB Cypress Creek SC	9455ca	
1200	1300		Ukraine, Radio Ukraine Intl	15520eu		1300	1400	USA, WTJC Newport NC	9370na	
1200	1300		USA, Armed Forces Radio	4319usb	5446usb	1300	1400	USA, WWCR Nashville TN	5935na	
			5765usb	6350usb	7507usb	1300	1400	12160na	15825na	
			12133usb	12579usb	13362usb	13855usb		USA, WYFR Okeechobee FL	7355na	
1200	1300		USA, KTBN Salt Lake City UT	7505na		1300	1400	11740na	11830na	
1200	1300		USA, KWHR Naalehu HI	9930as		1305	1315	Zambia, Radio Christian Voice	9865da	
1200	1300	as	USA, Voice of America	11565pa		1305	1330	Turkmenistan, Turkmen Radio	5015do	
1200	1300		9760va	11705va	11715va	15250va	1315	Austria, Radio Austria Intl	6155eu	
			15425va				1320	Austria, Radio Austria Intl	17855as	
1200	1300		USA, WBOH Newport NC	5920am		1330	1345	UK, BBC World Service	15105af	
1200	1300		USA, WEWN Birmingham AL	5825na		1330	1350	UAE, Radio Dubai 13630eu	21640af	
1200	1300		USA, WHR Noblesville IN	9495am	9840na	1330	1357	17865eu	21605eu	
1200	1300		USA, WINB Red Lion PA	9320am		1330	1400	Vietnam, Voice of	9730eu	
1200	1300		USA, WJIE Louisville KY	13595am		1330	1400	Guam, AWR/KSDA 15660as		
1200	1300		USA, WRMI Miami FL	15725na		1330	1400	Guam, AWR/KSDA 11755as		
1200	1300	a	USA, WSHB Cypress Creek SC	9455am		1330	1400	India, All India Radio	9690as	
1200	1300		USA, WTJC Newport NC	9370na		1330	1400	13710as	11620as	
1200	1300		USA, WWCR Nashville TN	5070na	5935na	1330	1400	Laos, National Radio	7145as	
			7560na	15825na		1330	1400	Serbia & Montenegro, Intl Radio	11835au	
1200	1300		USA, WYFR Okeechobee FL	5950na	7355na	1330	1400	Sweden, Radio	17505va	
			11830na	11970na	13695na		1330	1400	DRM	18960va
1200	1300		Zambia, Radio Christian Voice	9865do		1330	1400	Sweden, Radio	9815eu	
1215	1245	m	Germany, Bible Voice Broadcasting	12350as		1330	1400	Turkey, Voice of	15155va	
1215	1300		Egypt, Radio Cairo 15445al	17670as		1330	1400	UAE, AWR Africa	15235as	
1230	1245		UK, BBC World Service	15425af	17780af	1330	1400	Uzbekistan, Radio Tashkent Intl	5060as	
1230	1257		21640af			1335	1345	6025as9715as	5975as	
1230	1300		Vietnam, Voice of	9840as	12020as	1345	1400	Austria, Radio Austria Intl	6155eu	
1230	1300		Australia, HCJB	15390pa		1345	1400	Austria, Radio Austria Intl	13730eu	
1230	1300		Bangladesh, Bangla Betar	7185as	9550as	1345	1400	Austria, Radio Austria Intl	17855as	
1230	1300		Bulgaria, Radio	11700eu						
1230	1300		Sri Lanka, SLBC	6005as	9770as	15745as				
1230	1300		Thailand, Radio	9810as						

1300 UTC - 8AM EST / 7AM CST / 5AM PST

1300	1330		Ecuador, HCJB	21455va		1400	1415	Germany, Bible Voice Broadcasting	7485as	
1300	1330		Egypt, Radio Cairo	15445al	17670as	1400	1415	Serbia & Montenegro, Intl Radio	9445as	
1300	1355		Poland, Radio Polonia	9525eu	11820eu	1400	1415	UK, BBC World Service	11860af	
1300	1356		China, China Radio Intl	9570na	9755pa	1400	1420	Turkey, Voice of	15155as	
			11760pa	11900as	11980as	1400	1429	Czech Rep, Radio Prague Intl	15195eu	
1300	1356		North Korea, Voice of	9405as	7505eu	1400	1430	Netherlands, Radio	21745va	
			9335na	11335eu	11710am	1400	1430	Thailand, Radio	12080as	
1300	1356		Romania, Radio Romania Intl	15105eu	17745eu	1400	1456	China, China Radio Intl	15595as	
1300	1400		Anguilla, Caribbean Beacon	11775am		1400	1500	Anguilla, Caribbean Beacon	11675as	
1300	1400		Australia, HCJB	15390pa		1400	1500	Australia, HCJB	17720na	
1300	1400		Australia, Radio	5995pa	6020pa	1400	1500	Australia, Radio	1775am	
			9580va	9590as	6035va	1400	1500	Australia, Voice Intl	6080pa	
1300	1400		Australia, Voice Intl	13685as		1400	1500	Australia, Voice Intl	7240as	
1300	1400		Canada, CBC Northern Service	9625do		1400	1500	Canada, CBC Northern Service	9625do	
1300	1400		Canada, CFRX Toronto ON	6070do		1400	1500	Canada, CFRX Toronto ON	6070do	
1300	1400		Canada, CFVP Calgary AB	6030do		1400	1500	Canada, CFVP Calgary AB	6030do	
1300	1400		Canada, CKZN St John's NF	6160do		1400	1500	Canada, CKZN St John's NF	6160do	
1300	1400		Canada, CKZU Vancouver BC	6160do		1400	1500	Canada, CKZU Vancouver BC	6160do	
1300	1400	mtwhf	Canada, Radio Canada Intl	17820am	9515am	1400	1500	Canada, Radio Canada Intl	9515am	
1300	1400		Canada, Radio Canada Intl	9515am	13655am	1400	1500	Canada, Radio Canada Intl	13655am	
1300	1400		Costa Rica, University Network	5030am	6150am	1400	1500	Costa Rica, University Network	6150am	
			7375am	9725sa	11870am	13750na	1400	1500	Finland, Scandinavian Weekend Radio	13750na
1300	1400		17645as			1400	1500	11720eu	13750na	
1300	1400	1st a/month	Finland, Scandinavian Weekend Radio	11720eu		1400	1500	France, Radio France Intl	11610as	
1300	1400		Germany, Deutsche Welle	6140eu	9655va	1400	1500	Germany, Deutsche Welle	6140eu	
1300	1400		15440va			1400	1500	Germany, Overcomer Ministries	6110eu	
1300	1400	as/vl	Germany, Overcomer Ministries	6110eu	13810me	1400	1500	21590sa	13810eu	
1300	1400		Italy, IRRS	13840va		1400	1500	India, All India Radio	9690as	
1300	1400		Jordan, Radio	11690eu		1400	1500	Japan, Radio	9845as	
1300	1400	m-f/ DRM	Luxembourg, RTL Radio Lutzeburg	6095eu		1400	1500	Japan, Radio	11840va	
1300	1400		Malaysia, RTM Radio 4	7295do		1400	1500	Jordan, Radio	11690eu	
1300	1400		New Zealand, Radio NZ Intl	9870pa		1400	1500	Luxembourg, RTL Radio Lutzeburg	6095eu	
1300	1400		Papua New Guinea, NBC	4890do	9675irr	1400	1500	New Zealand, Radio NZ Intl	9870pa	
1300	1400		Singapore, Radio Singapore Intl	6150as	9600as	1400	1500	Oman, Radio	15140eu	
1300	1400		South Africa, Radio Veritas	7240af		1400	1500	Singapore, Medicorp Radio	6150do	
1300	1400		South Korea, Radio Korea Intl	9570as	13670as	1400	1500	South Africa, Channel Africa	9525af	
1300	1400		Sri Lanka, SLBC	6005as	9770as	1400	1500	Sri Lanka, SLBC	9770as	
1300	1400		UK, BBC World Service	6190af	15745as	1400	1500	Taiwan, Radio Taiwan Intl	15265as	
			9740as11760me	11940af	12095eu	1400	1500	UK, BBC World Service	6190af	
			15310as	15420af	15485eu	1400	1500	17640eu	6195as	
			15575me	17640eu	17760as	1400	1500	17640eu	15190am	
			17830af	17885af	21470af	1400	1500	17830af	15190am	
1300	1400		USA, Armed Forces Radio	4319usb	5446usb	1400	1500	USA, Armed Forces Radio	15190am	
			5765usb	6350usb	7507usb	1400	1500	15310as	15190am	
			12133usb	12579usb	13362usb	1400	1500	15485eu	15190am	
1300	1400		USA, KNLS Anchor Point AK	9780as	13855usb	1400	1500	15565eu	15190am	
1300	1400		USA, KTBN Salt Lake City UT	7505na		1400	1500	17640eu	15190am	

Shortwave Guide



1400	1500	USA, KJES Vado NM	11715na	1500	1600	USA, WHRI Noblesville IN	9840na	15105am	
1400	1500	USA, KTBN Salt Lake City UT	7505na	1500	1600	USA, WINB Red Lion PA	9930am		
1400	1500	USA, KWHR Naalehu HI	9930as	1500	1600	USA, WJIE Louisville KY	13595am		
1400	1500	USA, Voice of America	6110va	7125va	1500	1600	USA, WRMI Miami FL	15725na	
		9645va	9760va	11705va	15205va	1500	1600	USA, WTJC Newport NC	9370na
		15425va				1500	1600	USA, WWCR Nashville TN	9475na
1400	1500	mtwhf	USA, WBCQ Kennebunk ME	17495na	1500	1600	13845na	15825na	
1400	1500		USA, WBOH Newport NC	5920am	1500	1600	USA, WWRB Manchester TN	9320na	
1400	1500		USA, WEWN Birmingham AL	9955na	1500	1600	USA, WYFR Okeechobee FL	6280as	
1400	1500		USA, WHRA Greenbush ME	17560af	15105am	15520as	17760na	Zambia, Radio Christian Voice	
1400	1500		USA, WHRI Noblesville IN	9840na	1515	1600	4965do	Germany, Bible Voice Broadcasting	
1400	1500		USA, WINB Red Lion PA	9930am	1515	1530	9860me	Vatican City, Vatican Radio	
1400	1500		USA, WJIE Louisville KY	13595am	1515	1530	13765as	15235as	
1400	1500		USA, WRMI Miami FL	15725na	1530	1600	Germany, Bible Voice Broadcasting	9860me	
1400	1500		USA, WTJC Newport NC	9370na	1530	1600	Germany, Bible Voice Broadcasting	9705as	
1400	1500		USA, WWCR Nashville TN	9475na	12160na	Iran, Voice of the Islamic Rep	7190as	9610as	
			13845na	15825na	1530	1600	UAE, AWR Africa	15225as	
1400	1500	mtwhf	USA, WWRB Manchester TN	9320na	12172na	UK, BBC World Service	11685as	15540as	
1400	1500		USA, WYFR Okeechobee FL	11560as	11740na	Vatican City, Vatican Radio	9865af	13765at	
1400	1500		11830na	17760am	1530	1600	15235af		
1400	1500	Zambia, Radio Christian Voice	9865do	6100as					
1415	1420	Nepal, Radio	3230as	5005as					
		7164as							
1415	1430	Germany, Bible Voice Broadcasting	7485as						
1430	1445	Germany, Bible Voice Broadcasting	7485as						
1430	1500	Germany, Pan American BC	13605me						
1430	1500	Myanmar, Radio	5040do						
1430	1500	DRM	5985do						
1430	1500	Netherlands, Radio	9815eu						
1430	1500	Netherlands, Radio	12070as	12080as	15595as				
1430	1500	Sweden, Radio	17505va	18960va					
1445	1500	Germany, Bible Voice Broadcasting	7485as						
1445	1500	Guam, TWR/KTWR	15330as						
1445	1500	UK, BBC World Service	6140as	7205as					
		15425as							

1500 UTC - 10AM EST / 9AM CST / 7AM PST

1500	1530	Mongolia, Voice of	9720as					
1500	1530	UK, BBC World Service	21490af	11860af	15420af			
1500	1545	Guam, TWR/KTWR	15330as					
1500	1555	Netherlands, Radio	12070as	12080as	15595as			
1500	1556	China, China Radio Intl	11675as	7160as	9785as			
		11765as	13685af	15125af				
1500	1556	North Korea, Voice of	4405as	7505eu				
		9335am	11335eu	11710am				
1500	1559	Canada, Radio Canada Intl	9515am	9635as				
		11935as	13655am	17820am				
1500	1600	Anguilla, Caribbean Beacon	11775am					
1500	1600	Australia, HCJB	15390pa					
1500	1600	Australia, Radio	5995va	6080pa	7240as			
		9475as	9590as	11750as				
1500	1600	Australia, Voice Intl	13635as					
1500	1600	Canada, CBC Northern Service	9625do					
1500	1600	Canada, CFRX Toronto ON	6070do					
1500	1600	Canada, CFVP Calgary AB	6030do					
1500	1600	Canada, CKZN St John's NF	6160do					
1500	1600	Canada, CKZU Vancouver BC	6160do					
1500	1600	Costa Rica, University Network	5030am	6150am	7375am	9725sa	5030am	6150am
		7375am	9725sa	11870am	13750na			
		17645as						
1500	1600	1st a/month Finland, Scandinavian Weekend	5990eu					
		11720eu						
1500	1600	Germany, Deutsche Welle	6140eu					
1500	1600	Germany, Overcomer Ministries	6110eu	13810eu				
		21590sa						
1500	1600	Germany, Pan American BC	12015me	9505am	9750as			
1500	1600	Japan, Radio	7200as					
		9845as						
1500	1600	Jordan, Radio	11690na					
1500	1600	m-f/ DRM Luxembourg, RTL Radio Lutzeburg	6095eu					
1500	1600	Myanmar, Radio	5040do					
1500	1600	New Zealand, Radio NZ Intl	5985do					
1500	1600	Russia, Voice of	6205as	7260as	7315as			
		7350as	11500as					
1500	1600	Seychelles, FEBA	7340as					
1500	1600	Singapore, Mediacion Radio	6150do					
1500	1600	South Africa, Channel Africa	9525af	17770af				
1500	1600	Sri Lanka, SLBC	6005as	9770as	15745as			
1500	1600	UK, BBC World Service	5975as	6190af				
		6195as	7160as	9410eu	9740as	11940af	12095eu	15190am
		12095eu	15190am	15310as	15400af	15485eu	15565eu	17790as
		15485eu	15565eu	17790as	17830af	21470af	21660af	
		21470af	21660af					
1500	1600	USA, Armed Forces Radio	4319usb	5446usb	1600	1700	17715af	17895af
		5765usb	6350usb	10320usb	1600	1700	17895af	17950as
		12133usb	12579usb	13855usb	1600	1700	17950as	18010as
1500	1600	USA, KJES Vado NM	11715na		1600	1700	18010as	18070as
1500	1600	USA, KTBN Salt Lake City UT	15590na		1600	1700	18070as	18130as
1500	1600	USA, KWHR Naalehu HI	9930as		1600	1700	18130as	18190as
1500	1600	USA, Voice of America	6110va	9765va	1600	1700	18190as	18250as
		9575va			1600	1700	18250as	18310as
		13600va			1600	1700	18310as	18370as
		15395va			1600	1700	18370as	18430as
		15240af			1600	1700	18430as	18490as
		17715af			1600	1700	18490as	18550as
		17895af			1600	1700	18550as	18610as
1500	1600	USA, WBCQ Kennebunk ME	17495na		1600	1700	18610as	18670as
		17495na			1600	1700	18670as	18730as
		12133usb			1600	1700	18730as	18790as
1500	1600	USA, KJES Vado NM	15395va	15460va	1600	1700	18790as	18850as
1500	1600	USA, KTBN Salt Lake City UT	15590na		1600	1700	18850as	18910as
1500	1600	USA, KWHR Naalehu HI	9930as		1600	1700	18910as	18970as
1500	1600	USA, Voice of America	6110va	9765va	1600	1700	18970as	19030as
		9575va			1600	1700	19030as	19090as
		13600va			1600	1700	19090as	19150as
		15395va			1600	1700	19150as	19210as
		15240af			1600	1700	19210as	19270as
		17715af			1600	1700	19270as	19330as
		17895af			1600	1700	19330as	19390as
		18010as			1600	1700	19390as	19450as
		18070as			1600	1700	19450as	19510as
		18130as			1600	1700	19510as	19570as
		18190as			1600	1700	19570as	19630as
		18250as			1600	1700	19630as	19690as
		18310as			1600	1700	19690as	19750as
		18370as			1600	1700	19750as	19810as
		18430as			1600	1700	19810as	19870as
		18490as			1600	1700	19870as	19930as
		18550as			1600	1700	19930as	20000as
		18610as			1600	1700	20000as	20060as
		18670as			1600	1700	20060as	20120as
		18730as			1600	1700	20120as	20180as
		18790as			1600	1700	20180as	20240as
		18850as			1600	1700	20240as	20300as
		18910as			1600	1700	20300as	20360as
		18970as			1600	1700	20360as	20420as
		19030as			1600	1700	20420as	20480as
		19090as			1600	1700	20480as	20540as
		19150as			1600	1700	20540as	20600as
		19210as			1600	1700	20600as	20660as
		19270as			1600	1700	20660as	20720as
		19330as			1600	1700	20720as	20780as
		19390as			1600	1700	20780as	20840as
		19450as			1600	1700	20840as	20900as
		19510as			1600	1700	20900as	20960as
		19570as			1600	1700	20960as	21020as
		19630as			1600	1700	21020as	21080as
		19690as			1600	1700	21080as	21140as
		19750as			1600	1700	21140as	21200as
		19810as			1600	1700	21200as	21260as
		19870as			1600	1700	21260as	21320as
		19930as			1600	1700	21320as	21380as
		20000as			1600	1700	21380as	21440as
		20060as			1600	1700	21440as	21500as
		20120as			1600	1700	21500as	21560as
		20180as			1600	1700	21560as	21620as
		20240as			1600	1700	21620as	21680as
		20300as			1600	1700	21680as	21740as
		20360as			1600	1700	21740as	21800as
		20420as			1600</			

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1600	1700	USA, WYFR Okeechobee FL	11830na	11865na		21535af	Austria, AWR Europe	15385me
		15520na	17760na	17790af	18980eu		Guam, AWR/KSDA	9385me
		21455eu					Liberia, ELWA	4760do
1600	1700	Zambia, Radio Christian Voice	4965do				Philippines, Radio Pilipinas	11730me 11890me
1605	1610	as	Austria, Radio Austria Intl	17865na			15190me	
1610	1625		Austria, Radio Austria Intl	17865na			Slovakia, Radio Slovakia Intl	5915eu 6055eu
1625	1630	as	Austria, Radio Austria Intl	17865na			7345eu	
1630	1700		Egypt, Radio Cairo	9855af			Switzerland, Swiss Radio Intl	9755af 11810af
1630	1700		Georgia, Radio Georgia	6180me			15555 skd1203	
1630	1700		Guam, AWR/KSDA	11980as			UK, BBC World Service	3390af 5875eu
1630	1700	s	Ireland, Reflections Europe	3910eu	6295eu		7105eu	9530eu 9685af
		12255eu					7230af	
1630	1700		UK, BBC World Service	15420af			Vatican City, Vatican Radio	13765af 15570af
1630	1700	as	UK, BBC World Service	11860af	21490af		17515af	
1635	1640	as	Austria, Radio Austria Intl	17865na			Paraguay, Radio Nacional	9739sa
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930do			Turkmenistan, Turkmen Radio	4930as
1640	1655		Austria, Radio Austria Intl	17865na			Bangladesh, Bangla Betar	7185eu
1645	1700		Tajikistan, Tajik Radio	7245as			India, All India Radio	7410eu 9445af
1655	1700	as	Austria, Radio Austria Intl	17865na			9950eu	11620eu 11935af
							15075af	15155af 17670af
							New Zealand, Radio NZ Intl	11980pa

1700 UTC - 12PM EST / 11AM CST / 9AM PST

1700	1715	vl	Somalia, Radio Galkayo	6985va	9615va		1800 UTC - 1PM EST / 12PM CST / 10AM PST	
1700	1727		Czech Rep, Radio Prague Intl	5930eu	17485af			
1700	1727		Vietnam, Voice of	9725eu			1800	1810
1700	1730		Azerbaijan, Voice of	6110eu			1800	1815
1700	1730		France, Radio France Intl	9155eu			1800	1815
1700	1730		Guam, AWR/KSDA	11560me	15605af		1800	1815
1700	1730		Jordan, Radio	11690na			1800	1827
1700	1730	mtwhf	Moldova, Radio Pridnestrovye	5960eu			1800	1827
1700	1745		UK, BBC World Service	6005eu			1800	1830
1700	1750		New Zealand, Radio NZ Intl	9870pa			1800	1830
1700	1756		China, China Radio Intl	7190af	9570af		1800	1830
		13685af	15125af				1800	1830
1700	1800		Anguilla, Caribbean Beacon	11775am			1800	1830
1700	1800		Australia, Radio	5995va	6080pa		1800	1830
		9475as	9710va	11880pa			1800	1830
1700	1800		Australia, Voice Intl	13635as			1800	1830
1700	1800		Canada, CBC Northern Service	9625do			1800	1855
1700	1800		Canada, CFRX Toronto ON	6070do			1800	1900
1700	1800		Canada, CFVP Calgary AB	6030do			1800	1900
1700	1800		Canada, CKZN St John's NF	6160do			1800	1900
1700	1800		Canada, CKZU Vancouver BC	6160do			1800	1900
1700	1800		Costa Rica, University Network	5030am	6150am		1800	1900
		7375am	9725sa	11870am	13750na		1800	1900
		17645as					1800	1900
1700	1800		Egypt, Radio Cairo	9855af			1800	1900
1700	1800		Eqt Guinea, Radio Africa	7189af	15184al		1800	1900
1700	1800	1st a/month	Finland, Scandinavian Weekend	5990eu			1800	1900
		11720eu					1800	1900
1700	1800	a w fa	Germany, Bible Voice Broadcasting	9860me			1800	1900
1700	1800	as	Germany, Bible Voice Broadcasting	11650me			1800	1900
1700	1800	DRM	Germany, Deutsche Welle	6140eu			1800	1900
1700	1800		Germany, Radio Africa Intl	11735af	13820af		1800	1900
1700	1800	a	Greece, Voice of	9420na	15630eu		1800	1900
1700	1800	s	Ireland, Reflections Europe	3910eu	6295eu		1800	1900
		12255eu					1800	1900
1700	1800		Japan, Radio	9535am	11970eu		1800	1900
1700	1800		Russia, Voice of	5910as	5945as		1800	1900
1700	1800		Swaziland, TWR	3200af	9500af		1800	1900
1700	1800		Taiwan, Radio Taiwan Intl	11550as			1800	1900
1700	1800		UK, BBC World Service	3255af	3915as		1800	1900
		5975as	6190af	6195eu	7160as		1800	1900
		9510as	9630am	12095eu	15310as		1800	1900
		15075as	15209af	15400eu	15400af		1800	1900
1700	1800		USA, Armed Forces Radio	4319usb	5446usb		1800	1900
		5765usb	6350usb	7507usb	10320usb		1800	1900
		12133usb	12579usb	13362usb	13855usb		1800	1900
1700	1800		USA, KTBN Salt Lake City UT	15590na	6110va		1800	1900
1700	1800		USA, Voice of America	7125va	9645va		1800	1900
		15205va	15240af	15395va	15445af		1800	1900
1700	1800	mtwhf	USA, Voice of America	5990va	6045va		1800	1900
		9525va	9795va	11955va	12005va		1800	1900
		13600af	15255va				1800	1900
1700	1800	mtwhf	USA, WBCQ Kennebunk ME	9330na	17495na		1800	1900
1700	1800		USA, WBOH Newport NC	5920am			1800	1900
1700	1800		USA, WEWN Birmingham AL	13615na	17840af		1800	1900
1700	1800		USA, WHRA Greenbush ME	17650af			1800	1900
1700	1800		USA, WHRI Noblesville IN	13760va	15105am		1800	1900
1700	1800		USA, WINB Red Lion PA	9930am			1800	1900
1700	1800	mtwhf	USA, WJIE Louisville KY	13595am			1800	1900
1700	1800		USA, WMLK Bethel PA	9465eu			1800	1900
1700	1800		USA, WRMI Miami FL	15725na			1800	1900
1700	1800	ta	USA, WSHB Cypress Creek SC	17505af			1800	1900
1700	1800		USA, WTJC Newport NC	9370na			1800	1900
1700	1800		USA, WWCR Nashville TN	9475na	12160na		1800	1900
		13845na	15825na				1800	1900
1700	1800	smtwhf	USA, WWRB Manchester TN	9320na	12172na		1800	1900
1700	1800		USA, WYFR Okeechobee FL	18980eu	21455eu		1800	1900
		21680af					1800	1900
1700	1800		Zambia, Radio Christian Voice	4965do			1800	1900
1715	1730		Vatican City, Vatican Radio	4005eu	5890eu		1800	1900
		7250eu	9645eu	15595va			1800	1900
1730	1726		Romania, Radio Romania Intl	9570eu	11940eu		1800	1900
1730	1740	vl	Libya, Voice of Africa	15220irr	15615irr		1800	1900
		15660irr	17880irr				1800	1900
1730	1745	mtwhf	UK, United Nations Radio	7170af	15495me		1800	1900

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1800	1900		USA, WTJC Newport NC	9370na		1900	2000		USA, Voice of America	4950af	6035af
1800	1900		USA, WWCR Nashville TN	9475na	12160na				7415na	9760va	9785va
			13845na	15825na				7415na	9690va		
1800	1900	smtwhf	USA, WWRB Manchester TN	9320na	12172na			11870va	11975af	12015va	13640va
1800	1900		USA, WYFR Okeechobee FL	18980eu				13710af	15180va	15240af	15580af
1800	1900		Yemen, Rep of Yemen Radio	9780me				17895af			
1800	1900		Zambia, Radio Christian Voice	4965do		1900	2000		USA, WBCQ Kennebunk ME	7415na	
1815	1900		Bangladesh, Bangla Betar	7185eu	9550eu	1900	2000		USA, WBCQ Kennebunk ME	9330na	17495na
			15550eu			1900	2000		USA, WBOH Newport NC	5920am	
1820	1830	vl	Libya, Voice of Africa	11635irr	11715irr	1900	2000		USA, WEWN Birmingham AL	13615na	17840af
			11860irr	17880irr		1900	2000		USA, WHRA Greenbush ME	17650af	
1830	1845		Germany, IBRA Radio	9520af		1900	2000		USA, WHRI Noblesville IN	9495am	13760va
1830	1845	m w	UK, BBC World Service	6050eu	7105eu	1900	2000		USA, WJIE Louisville KY	1395am	
			9685eu			1900	2000	mtwhf	USA, WJLB Bethel PA	9465eu	
1830	1859	s	Belgium, Radio Vlaanderen Intl	5910va	7330eu	1900	2000		USA, WRLM Miami FL	15725na	
1830	1900		Austria, AWR Europe	11865me		1900	2000	a	USA, WSHB Cypress Creek SC	15665eu	
1830	1900		Bulgaria, Radio	5800eu	7500eu	1900	2000		USA, WSHB Cypress Creek SC	17505af	
1830	1900		Georgia, Radio Georgia	11910eu		1900	2000		USA, WTJC Newport NC	9370na	
1830	1900		South Africa, AWR Africa	11985af		1900	2000		USA, WWCR Nashville TN	9475na	12160na
1830	1900	mtwhf a	Sweden, Radio	6065va				13845na	15825na		
1830	1900		UK, RTE Radio	13640na	21640na	1900	2000	smtwhf	USA, WWRB Manchester TN	9320na	12172na
1845	1900		Congo, RTV Congolaise	4765af	5985af	1900	2000		USA, WYFR Okeechobee FL	3230af	15115af

1900 UTC - 2PM EST / 1PM CST / 11AM PST

1900	1915	Congo, RTV Congolaise	4765af	5985af	1915	1925	Rwanda, Radio	6005do		
1900	1915	Germany, Bible Voice Broadcasting	7295af		1915	1930	Germany, Bible Voice Broadcasting	Broadcasting	6015eu	
1900	1915	Germany, Bible Voice Broadcasting	6015eu		1915	1930	Germany, Bible Voice Broadcasting	Broadcasting	7295af	
1900	1915	smtwhf					9470me			
1900	1915	a fa			1915	1930	UK, BBC World Service	15105af	17885af	
1900	1927	Vietnam, Voice of	7280eu	9730eu	1923	1930	Libya, Voice of Africa	15105af	15315af	
1900	1930	s	Germany, Universal Life	7105me	1930	1945	Germany, Bible Voice Broadcasting	Broadcasting	6015eu	
1900	1930	s	Greece, Voice of	7475eu	1940	1945	Germany, Bible Voice Broadcasting	Broadcasting	7295af	
			17705na		1930	2000	Georgia, Radio Georgia	11760eu		
1900	1930		Philippines, Radio Pilipinas	11730me	11890me	1930	2000	Germany, AWR Europe	11845eu	
			15190me		1930	2000	Germany, Bible Voice Broadcasting	Broadcasting	9470me	
1900	1945		India, All India Radio	7410eu	9445af	1930	2000	Greece, Voice of	12105eu	
			9950eu	11620eu	11935af	1930	2000	Greece, Voice of	7475eu	9420eu
			15075af	15155af	13605af	1930	2000	17705na		15630eu
1900	1950		New Zealand, Radio NZ Intl	11980pa		1930	2000	Iran, Voice of the Islamic Rep	6110eu	7320eu
1900	1956		China, China Radio Intl	9440af	9585af	1930	2000	Papua New Guinea, NBC	4890do	9675irr
1900	1956		North Korea, Voice of	4405as	7505eu	1930	2000	Serbia & Montenegro, Intl Radio	6100eu	
			11335eu	11710eu		1930	2000	Slovakia, Radio Slovakia Intl	5915eu	6055eu
1900	2000		Anguilla, Caribbean Beacon	11775am		1930	2000	7345eu		
1900	2000		Australia, HCJB	11765pa		1930	2000	Switzerland, Swiss Radio Intl	9820va	11920va
1900	2000		Australia, Radio	6080pa	7240va	1930	2000	13660va	17660va	
			9580va	9710pa	9500as	1930	2000	Turkey, Voice of	5980eu	
			Australia, Voice Intl	11685as		1935	1955	Italy, RAI Intl	5965eu	9755eu
1900	2000	vl	Botswana, Radio	4820do	4830al	1945	2000	Albania, Radio Tirana Intl	7210eu	9510eu
1900	2000		Canada, CBC Northern Service	9625do		1945	2000	Germany, Bible Voice Broadcasting	7295af	6015eu
1900	2000		Canada, CFRX Toronto ON	6070do		1951	2000	New Zealand, Radio NZ Intl	15265pa	
1900	2000		Canada, CFVP Calgary AB	6030do						
1900	2000		Canada, CKZN St John's NF	6160do						
1900	2000		Canada, CKZU Vancouver BC	6160do						
1900	2000		Costa Rica, University Network	5030am	6150am					
			7375am	9725sa	11870am					
			17645as		13750na					

2000 UTC - 3PM EST / 2PM CST / 12PM PST

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2000	2100	vl	Ghana, Ghana BC Corp	3366do	4915do	2100	2156	North Korea, Voice of	4405as	7505eu
2000	2100		Indonesia, Voice of	15150eu		2100	2159	11335eu		
2000	2100	s	Ireland, Reflections Europe	3910eu	6295eu	2100	2200	Canada, Radio Canada Intl	5850va	7235va
			12255eu			2100	2200	7425va	9770va	13650va
2000	2100	vl	Italy, IRRS	5775va		2100	2200	Anguilla, Caribbean Beacon	11775am	
2000	2100		Kuwait, Radio	11990va		2100	2200	Australia, ABC NT Alice Springs	2310do	4835irr
2000	2100		Latvia, Laser Radio	9290eu		2100	2200	Australia, Radio	9500as	11650va
2000	2100		Liberia, ELWA	4760do				11880va	12080va	21740va
2000	2100		Malaysia, RTM Radio 4	7295do		2100	2200	Australia, Voice Intl	9795as	
2000	2100		Namibia, Namibian BC Corp	3270af	3290af	2100	2200	Austria, AWR Europe	9660af	
			6060af			2100	2200	Botswana, Radio	4820do	4830al
2000	2100		New Zealand, Radio NZ Intl	15265pa		2100	2200	Canada, CBC Northern Service	9625do	
2000	2100		Nigeria, Radio/Enugu	6025do		2100	2200	Canada, CFRX Toronto ON	6070do	
2000	2100		Nigeria, Radio/Ibadan	6050do		2100	2200	Canada, CFVP Calgary AB	6030do	
2000	2100		Nigeria, Radio/Kaduna	4770do	6090do	2100	2200	Canada, CKZN St John's NF	6160do	
2000	2100		Nigeria, Radio/Lagos	3326do	4990do	2100	2200	Canada, CKZU Vancouver BC	6160do	
2000	2100		Nigeria, Voice of	17800af		2100	2200	Costa Rica, University Network	5030am	6150am
2000	2100		Papua New Guinea, NBC	4890do	9675irr			7375am	9725sa	13750am
2000	2100		Russia, Voice of	6145eu	6235eu	2100	2200	17645as	11870am	13750na
2000	2100		7360eu			2100	2200	Eqt Guinea, Radio Africa	7189af	15184al
2000	2100		Sierra Leone, Radio UNAMSIL	6139af		2100	2200	Finland, Scandinavian Weekend	5990eu	
2000	2100		Sierra Leone, SLBS	3316do				11720eu		
2000	2100	vl	Solomon Islands, SIBC	5020do	9545do	2100	2200	Germany, Deutsche Welle	9615af	13780af
2000	2100		South Africa, AWR Africa	15295af		2100	2200	15410af		
2000	2100		South Africa, Channel Africa	3345af		2100	2200	Ghana, Ghana BC Corp	3366do	4915do
2000	2100		Syria, Radio Damascus	12085eu	13610eu	2100	2200	Guyana, Voice of	5949do	
2000	2100		Uganda, Radio	4976do	5026do	2100	2200	India, All India Radio	7410eu	9445eu
2000	2100		UK, BBC World Service	6190af	6195eu	2100	2200	9575au	9910au	11620va
			15400af	9410eu			11715au			
2000	2100		USA, Armed Forces Radio	4319usb	5446usb	2100	2200	Ireland, Reflections Europe	3910eu	6295eu
			5765usb	6350usb	7507usb	2100	2200	12255eu		
			12133usb	12579usb	13362usb	2100	2200	Japan, Radio	6090eu	6180eu
2000	2100		USA, KAIJ Dallas TX	13815va		2100	2200	11920va	17825na	21670as
2000	2100		USA, KTBN Salt Lake City UT	15590na		2100	2200	Latvia, Laser Radio	9290eu	
2000	2100		USA, Voice of America	4950af	6035af	2100	2200	Liberia, ELWA	4760do	
			6095va	7415af	9690va	2100	2200	Malaysia, RTM Radio 4	7295do	3290af
			9690va	9760va	11855af	2100	2200	Namibia, Namibian BC Corp	3270af	
			13710af	15240af	15580af	2100	2200	6060af		
2000	2100		USA, WBOH Newport NC	5920am		2100	2200	New Zealand, Radio NZ Intl	15265pa	
2000	2100		USA, WEWN Birmingham AL	13615na	17595af	2100	2200	Nigeria, Radio/Enugu	6025do	
2000	2100		USA, WHRA Greenbush ME	17650as		2100	2200	Nigeria, Radio/Ibadan	6050do	
2000	2100		USA, WHRI Noblesville IN	5745va	9495am	2100	2200	Nigeria, Radio/Kaduna	4770do	6090do
2000	2100		USA, WINB Red Lion PA	9930am		2100	2200	Nigeria, Radio/Lagos	3326do	4990do
2000	2100		USA, WJIE Louisville KY	13595am		2100	2200	Nigeria, Voice of	17800af	
2000	2100	mtwhf	USA, WMKL Bethel PA	9465eu		2100	2200	Papua New Guinea, NBC	4890do	9675irr
2000	2100		USA, WRMI Miami FL	15725na		2100	2200	Russia, Voice of	6235eu	7290eu
2000	2100	mwfs	USA, WSHB Cypress Creek SC	15665af		2100	2200	Sierra Leone, SLBS	3316do	
2000	2100		USA, WTJC Newport NC	9370na		2100	2200	South Africa, Channel Africa	3345af	
2000	2100		USA, WWCR Nashville TN	9475na	12160na	2100	2200	Syria, Radio Damascus	12085eu	13610eu
			13845na	15825na			UK, BBC World Service	3255af	3915as	
2000	2100	smtwhf	USA, WWRB Manchester TN	9320na	12172na	2100	2200	5965as5975ca	6005af	6190af
2000	2100		USA, WYFR Okeechobee FL	3230af	5810eu			6195va	9410eu	9605af
			75800eu	15195sa	15565sa	2100	2200	15400af		12095sa
2000	2100	vl	Vanuatu, Radio	3945al	7260do	2100	2200	USA, Armed Forces Radio	4319usb	5446usb
2000	2100		Zambia, Radio Christian Voice	4965do		2100	2200	5765usb	6350usb	10320usb
2000	2100	vl	Zimbabwe, ZBC Corp	5975do	9515af	2100	2200	12133usb	12579usb	13855usb
2025	2045		Italy, RAI Intl	5985af	9515af	2100	2200	USA, KAIJ Dallas TX	13815va	
2030	2045		Thailand, Radio	9535eu		2100	2200	USA, KTBN Salt Lake City UT	15590na	
2030	2056		Romania, Radio Romania Intl	6110eu	7105eu	2100	2200	USA, Voice of America	6035af	6040va
2030	2057		Vietnam, Voice of	9730eu		2100	2200	6095va	7415af	9595va
2030	2059		Belgium, Radio Vlaanderen Intl	7330eu		2100	2200	9760va	11870va	11975af
2030	2100	t h	Belarus, Radio Belarus Intl	7105eu	7210eu	2100	2200	15185va	15240af	15580af
2030	2100		Cuba, Radio Havana	9505eu	11760eu	2100	2200	17820va	17895af	
2030	2100		Egypt, Radio Cairo	15375af		2100	2200	USA, WBCQ Kennebunk ME	7415na	17495na
2030	2100		Sweden, Radio	6065va	9400va	2100	2200	USA, WBOH Newport NC	5920am	17595af
2030	2100	as	USA, Voice of America	4950af		2100	2200	USA, WHRA Greenbush ME	13615na	
2030	2100		Uzbekistan, Radio Tashkent Intl	5025eu	7185eu	2100	2200	USA, WHRI Noblesville IN	5745va	9495am
			11905eu							
2040	2100	mtwhfa	Armenia, Voice of	4810eu	9960eu	2100	2200	USA, WINB Red Lion PA	9930am	
2045	2100		India, All India Radio	7410eu	9445eu	2100	2200	USA, WJIE Louisville KY	13595am	
			9575au	9910au	9950eu	2100	2200	15725na		
2045	2100	mtwhfa	USA, WBCQ Kennebunk ME	7415na		2100	2200	USA, WSHB Cypress Creek SC	11650eu	
2045	2100	mtwhfa	USA, WBCQ Kennebunk ME	5105na	9330na	2100	2200	15665af		
2050	2100		Vatican City, Vatican Radio	4005eu	5890eu	2100	2200	USA, WSHB Cypress Creek SC	15665af	
2050	2100	DRM	Vatican City, Vatican Radio	9800eu		2100	2200	USA, WTJC Newport NC	9370na	9475na
						2100	2200	USA, WWCR Nashville TN	7465na	
						2100	2200	12160na	13845na	
						2100	2200	USA, WWR Manchester TN	9320na	12172na
						2100	2200	USA, WYFR Okeechobee FL	5810eu	7580eu
						2100	2200	11740na	15565af	
						2100	2200	17575sa		
						2100	2200	Vanuatu, Radio	3945al	
						2100	2200	Zambia, Radio Christian Voice	4965do	
						2100	2200	Zimbabwe, ZBC Corp	5975do	
						2100	2200	UK, BBC World Service	5975ca	11675ca
								15390ca		
								Egypt, Radio Cairo	9989eu	15375af
								Libya, Voice of Africa	15105af	15315af
								Netherlands, Radio	9800na	11730na
								China, China Radio Intl	5965eu	9840eu
								Australia, ABC NT Katherine	5025do	
								Australia, ABC NT Tenant Creek	4910do	
								Belarus, Radio Belarus Intl	7105eu	7210eu
								Guam, AWR/KSDA	11980as	
								Guam, AWR/KSDA	12010as	
								Italy, IRRS	5775va	
								Turkey, Voice of	9525as	
								UK, Wales Radio	11710eu	
								USA, WBCQ Kennebunk ME	5105na	9330na
								17495na	5025eu	7185eu
								Uzbekistan, Radio Tashkent Intl	11905eu	
2100	2110		Vatican City, Vatican Radio	7250eu						
2100	2110	DRM	Vatican City, Vatican Radio	9800eu						
2100	2115		Egypt, Radio Cairo	15375af						
2100	2115	mtwhf	UK, BBC World Service	5975ca						
2100	2127		Czech Rep, Radio Prague Intl	5930eu	9430va					
2100	2130		Australia, ABC NT Katherine	2485do						
2100	2130		Australia, ABC NT Tenant Creek	2325do						
2100	2130		China, China Radio Intl	5965eu	9840eu					
			11640af	13630af						
2100	2130		Cuba, Radio Havana	9505na	11760eu					
2100	2130	vl	Italy, IRRS	5775va						
2100	2130	DRM	Netherlands, Radio	11730eu						
2100	2130	mtwhf	Nigeria, Radio Jakarta Intl	7380af						
2100	2130	mtwhf	USA, WBCQ Kennebunk ME	5105na	9330na					

2100 UTC - 4PM EST / 3PM CST / 1PM PST

Shortwave Guide



2200 UTC - 5PM EST / 4PM CST / 2PM PST

2200	2220	Turkey, Voice of	9525as		
2200	2228	Hungary, Radio	Budapest	6025eu	11965af
2200	2229	Belgium, Radio	Vlaanderen Intl	11730na	
2200	2230	Canada, Radio	Canada Intl	5850va	6045va
		9770va	12005va		
2200	2230	India, All India	Radio	7410eu	9445eu
		9575au	9910au	9950eu	11620va
		11715au			
2200	2230	Ireland, Reflections	Europe	3910eu	6295eu
		12255eu			
2200	2230	Italy, IRRS		5775va	
2200	2230	Liberia, ELWA		4760do	
2200	2230	Serbia & Montenegro, Intl	Radio	6100eu	
2200	2230	South Korea, Radio	Korea Intl	3955eu	
2200	2230	USA, Voice of America		6035af	7415af
		11655af	11975af	13710af	
2200	2237	New Zealand, Radio	NZ Intl	15265pa	
2200	2245	Egypt, Radio	Cairo	9989eu	
2200	2256	China, China Radio	Intl	7170eu	
2200	2256	Romania, Radio	Romania Intl	5975eu	7250eu
		9550na	11830na		
2200	2300	Anguilla, Caribbean	Beacon	6090am	
2200	2300	Australia, ABC NT	Alice Springs	2310do	4835irr
2200	2300	Australia, ABC NT	Katherine	5025do	
2200	2300	Australia, ABC NT	Tennant Creek	4910do	
2200	2300	Australia, Radio	9660va	11880va	12080va
		13620va	13630va	15230as	21740va
2200	2300	Australia, Voice	Intl	9795as	
2200	2300	Botswana, Radio	4820do	4830al	
2200	2300	Bulgaria, Radio		5800eu	7500eu
2200	2300	Canada, CBC Northern	Service	9625do	
2200	2300	Canada, CFRX	Toronto ON	6070do	
2200	2300	Canada, CFVP	Calgary AB	6030do	
2200	2300	Canada, CKZN	St John's NF	6160do	
2200	2300	Canada, CKZU	Vancouver BC	6160do	
2200	2300	Canada, Radio	Canada Intl	9800eu	
2200	2300	Costa Rica, University	Network	5030am	6150am
		7375am	9725sa	11870am	13750na
		17645as			
2200	2300	Eqt Guinea, Radio	Africa	7189af	15184al
2200	2300	Finland, Scandinavian	Weekend	Radio	5980eu
		11720eu			
2200	2300	Germany, Deutsche	Welle	6180as	6225as
2200	2300	vl		3366do	4915do
2200	2300	Ghana, Ghana BC	Corp	5949do	
2200	2300	Guyana, Voice of	3291do	7295do	
2200	2300	Malaysia, RTM	Radio 4	3270af	3290af
2200	2300	Namibia, Namibian	BC Corp	6060af	
2200	2300	Netherlands, Radio	15530eu		
2200	2300	Nigeria, Radio/Enugu		6025do	
2200	2300	Nigeria, Radio/Ibadan		6050do	
2200	2300	Nigeria, Radio/Kaduna		4770do	6090do
2200	2300	Nigeria, Radio/Lagos		3326do	4990do
2200	2300	Nigeria, Voice of	15120af	17800al	
2200	2300	Papua New Guinea, NBC		4890do	9675irr
2200	2300	Sierra Leone, Radio	UNAMISIL	6139af	
2200	2300	Sierra Leone, SLBS	3316do		
2200	2300	Solomon Islands, SIBC		5020do	9545do
2200	2300	Spain, Radio	Exterior Espana	9595af	9680eu
2200	2300	Taiwan, Radio	Taiwan Intl	9355eu	
2200	2300	UK, BBC World	Service	5965as	5975ca
		6195va	7105as	9605af	9740as
		11955as	12095sa	15400af	
2200	2300	Ukraine, Radio	Ukraine Intl	5840eu	
2200	2300	USA, Armed Forces	Radio	4319usb	5446usb
		5765usb	6350usb	7507usb	10320usb
		12133usb	12579usb	13362usb	13855usb
2200	2300	USA, KAJI	Dallas TX	13815va	
2200	2300	USA, KTBN	Salt Lake City UT	15590na	
2200	2300	USA, KWHR	Noalehu HI	17510as	
2200	2300	USA, Voice of America		7215va	9705va
		9890va	11760va	15185va	15290va
		15305va	17375va	17820va	
2200	2300	USA, WBCQ	Kennebunk ME	5105na	7415na
		9330na	17495na		
2200	2300	USA, WBOH	Newport NC	5920am	
2200	2300	USA, WEWN	Birmingham AL	9975na	17595af
2200	2300	USA, WHRA	Greenbush ME	17650af	
2200	2300	USA, WHRI	Noblesville IN	5745va	9495am
2200	2300	USA, WINB	Red Lion PA	9930am	
2200	2300	USA, WJIE	Louisville KY	13595am	
2200	2300	USA, WRMI	Miami FL	15725na	
2200	2300	USA, WSHB	Cypress Creek SC	7510eu	
2200	2300	USA, WSHB	Cypress Creek SC	15285sa	
2200	2300	USA, WTJC	Newport NC	9370na	
2200	2300	USA, WWCR	Nashville TN	5070na	7465na
		9475na	13845na		
2200	2300	USA, WWCR	Manchester TN	9320na	12172na
2200	2300	USA, WYFR	Okeechobee FL	7580eu	11740na
		21525af			
2200	2300	Vanuatu, Radio		3945al	7260do
2200	2300	Zambia, Radio	Christian Voice	4965do	
2205	2230	Italy, RAI	Intl	11895as	
2230	2257	Czech Rep, Radio	Prague Intl	7345na	9435af
2230	2300	Albania, Radio	Tirana Intl	7130eu	9530eu
2230	2300	Italy, IRRS		5775va	

2230	2300	Sweden, Radio	6065va		
2238	2300	New Zealand, Radio NZ	Intl	17675pa	
2245	2300	India, All India Radio		9705as	9950as
		11620as	13605as		

2300 UTC - 6PM EST / 5PM CST / 3PM PST

2300	0000		Anguilla, Caribbean Beacon	6090am	
2300	0000		Australia, ABC NT Alice Springs	2310do	4835irr
2300	0000		Australia, ABC NT Katherine	5025do	
2300	0000		Australia, ABC NT Tennant Creek	4910do	
2300	0000		Australia, Radio 9660pa	11695as	12080va
			13620as	13630as	15230as
			17795va	21740va	17750as
2300	0000		Australia, Voice Intl 13620as		
2300	0000	vl	Botswana, Radio 4820do	4830al	
2300	0000		Canada, CBC Northern Service	9625do	
2300	0000		Canada, CFRX Toronto ON	6070do	
2300	0000		Canada, CFVP Calgary AB	6030do	
2300	0000		Canada, CKZN St John's NF	6160do	
2300	0000		Canada, CKZU Vancouver BC	6160do	
2300	0000		Costa Rica, University Network	5030am	6150am
			7375am	9725sa	11870am
			17645as		13750na
2300	0000		Cuba, Radio Havana	9550am	
2300	0000	1st f/month	Egypt, Radio Cairo 11725na		
2300	0000		Finland, Scandinavian Weekend	Radio	5980eu
			11690eu		
2300	0000		Germany, Deutsche Welle	7250as	9815as
			12035as		
2300	0000	DRM	Germany, Deutsche Welle	9800as	
2300	0000	vl	Ghana, Ghana BC Corp	3366do	4915do
2300	0000		Guyana, Voice of 3291do	5949do	
2300	0000		India, All India Radio	9705as	9950as
			11620as	13605as	
2300	0000		Malaysia, RTM Radio 4	7295do	
2300	0000		Namibia, Namibian BC Corp	3270af	3290af
			6060af		
2300	0000		New Zealand, Radio NZ Intl	17675pa	
2300	0000		Papua New Guinea, NBC	4890do	9675irr
2300	0000		Sierra Leone, Radio UNAMSI	6139af	
2300	0000		Sierra Leone, SLBS 3316do		
2300	0000		Singapore, Mediacorp Radio	6150do	
2300	0000	vl	Solomon Islands, SIBC	5020do	9545do
2300	0000		UK, BBC World Service	3915as	5965as
			6035as6195va	9740as	11945as
			12095sa	15280as	11955as
2300	0000		USA, Armed Forces Radio	4319us	5446us
			5765usb	6350usb	10320usb
			12133usb	12579usb	13362usb
2300	0000		USA, KAU Dallas TX 13815va		
2300	0000		USA, KTBN Salt Lake City UT	15590na	
2300	0000		USA, KWHR Naalehu HI	17510as	
2300	0000		USA, WBCQ Kennebunk ME	5105na	7415na
			9330na		
2300	0000		USA, WBOH Newport NC	5920am	
2300	0000		USA, WFWN Birmingham AL	9975na	17595af
2300	0000		USA, WHRA Greenbush ME	7580va	
2300	0000		USA, WHRE Noblesville IN	5745va	9495am
2300	0000		USA, WINB Red Lion PA	9320am	
2300	0000		USA, WJIE Louisville KY	13595am	
2300	0000		USA, WRMI Miami FL	15725na	
2300	0000	mtwhf	USA, WRMI Miami FL	15725na	
2300	0000	ws	USA, WSHB Cypress Creek SC	7510va	
2300	0000	s	USA, WSHB Cypress Creek SC	15285am	
2300	0000		USA, WTJC Newport NC	9370na	
2300	0000	as	USA, WWBS Macon GA	11910na	
2300	0000		USA, WWCR Nashville TN	3210na	5070na
			7465na	13845na	
2300	0000		USA, WWRB Manchester TN	5050na	5085na
			6890na		
2300	0000		USA, WYFR Okeechobee FL	5985sa	11740na
			11855sa	15170sa	
2300	0000		USA, WYFR Okeechobee FL	5985ca	11855ca
			15170af		
2300	0000	vl	Vanuatu, Radio 3945al	7260do	
2300	0000		Zambia, Radio Christian Voice	4965do	
2300	2329		Canada, Radio Canada Intl	5960am	9590am
			11865am		
2300	2330		USA, Voice of America	6180va	7205va
			9780va	11735va	
2300	2330	w	USA, WBCQ Kennebunk ME	15110va	
2300	2350		Turkey, Voice of 6015va	17495na	
2300	2356		China, China Radio Intl	9655va	6040na
			13680na		
2300	2356		Romania, Radio Romania Intl	6180va	11940au
			15145au	15370au	
2304	0000		USA, WYFR Okeechobee FL	15400sa	
2315	2330		Croatia, Voice of 7285sa		
2330	0000		Canada, Radio Canada Intl	5960na	9590na
2330	0000		Lithuania, Radio Vilnius	9875na	
2330	0000		Switzerland, Swiss Radio Intl	9885sa	11660sa
2330	0000		USA, Voice of America	6180va	7130va
			7205va	9620va	9780va
			11805va	13640va	15110va
2330	2357		Czech Rep, Radio Prague Intl	5915na	7345na
2330	2357		Vietnam, Voice of 9840as	12020as	

Headnotes:

1. The **Deutsche Welle** transmissions that have provided credible reception in at least parts of North America are originate at the Kigali, Rwanda relay site and target West Africa. During the winter months only the 0600 and 2100 broadcasts have been consistently reliable, so we list the programs available at these times. Consult the frequency section of the SWG for where to tune.
2. **Listings for the US-based independent shortwave broadcasters are limited to general interest programming** that departs from their primary formats of religious and political fare. Please be aware that the schedules of these stations can be quite fluid, so we caution you that they are highly subject to change.
3. **BBCWS stream abbreviations:** (am)=Americas; (eas)=East Asia. These are the streams recommended by Bush House for North American listeners and both are included in the program schedules when identified by the BBC as potentially receivable on shortwave in North America.

0000 UTC 7pmET/4pmPT**BBC WORLD SERVICE (am)**

0000 D News; 0006 S Pick of the World (BBC's best), M Age of Empire (America in the modern world), T-A Outlook (magazine); 0032 M Quiz or panel game; 0045 S Write On (letters), T-A Off the Shelf (book readings).

RADIO AUSTRALIA

0000 D News; 0005 S Keys to Music (enjoying the classics), A Business Report; 0010 M AWAYE! (Aboriginal culture), T The Science Show, W The National Interest (Australian politics), H Background Briefing (documentary), F Hindsight (Australian history); 0030 A Ockham's Razor (science opinion); 0045 A Lingua Franca (about language).

RADIO CANADA INTERNATIONAL

0000 D CBC News; 0005 S Quirks & Quarks (science), M Global Village (world music), T-A As It Happens (interviews with newsmakers)[began at 2330]; 0030 H Dispatches (world events in Canadian perspective).

RADIO EXTERIOR ESPANA

0000 S Visitors Book (travelers to Spain), M Window on Spain (culture), T-A News (international, Spain, Latin America); 0015 S/M Spanish history or culture series; 0025 S/M Rebroadcast of 0035 weekday programs, T-A Spanish pop music; 0030 T-A Press Review; 0035 S/T Radio Waves, W Chronicles (Spain & the US), H Entremeses (food & travel), F Africa Today, A Radio Club (letters); 0045 T-A Language Without Bounds (Spanish lesson).

RADIO JAPAN - NHK WORLD

0000 D News; 0010 S Hello from Tokyo (listener contact), M Weekend Japanology, T-A Songs for Everyone; 0015 T-A 44 Minutes (magazine); 0054 M Japan: Take 5.

RADIO NETHERLANDS

0000 S/M News; T-A Newsline; 0005 S Wide Angle (in-depth), M Europe Unzipped; 0025 S The Week Ahead (on RN), M Insight (commentary); 0030 S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0000 S/A RNZ News, M-F Pacific Regional News; 0006 S At the Movies, M-F Wayne's Music (favorites), A Digital Life; 0030 S Bookmarks, A Saturday Comedy Zone.

VOICE OF AMERICA (News Now)

0000 T-A News and Reports; 0023 T-A Sports; 0030 T-A News Headlines; 0033 T-A Coast to Coast (American life).

WBCQ, Maine

7415 kHz.: 0000 S The Real Amateur Radio Show, M Le Show (humor/entertainment), H Off the Hook (public telecommunications issues), F Uncle Ed's Musical Memories (con't from 2130), A The Lost Discs Radio Show; 0030 S Fred Flintstone Music Show.

9330 kHz.: 0000 S Split Secs (free form).

0100 UTC 8pmET/5pmPT**BBC WORLD SERVICE (am)**

0100 D News; 0106 S Top of the Pops (British music charts), M Everywoman, T Age of Empire (America in the modern world), W Masterpiece (artistic ideas), H Passport Please (national identity-1/22, 29; 2/5) Documentaries (2/12, 19, 26), F Assignment, A Sports International; 0132 M Westway Omnibus, T Music Feature, W White Label (new music), H Charlie Gillett (world music), F Music Biz, A John Peel (eclectic).

CHINA RADIO INTERNATIONAL

0100 D News & Reports; 0110 S Report on Developing Countries; 0115 A Cutting Edge (sci/tech); 0120 S CRI Roundup; 0130 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0100 D News; 0105 S Correspondents' Report, A Asia Pacific (regional current affairs); 0110 M-F Asia Pacific; 0130 S In Conversation (about science), M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor, A The Lounge (interviews).

[Special service: 0105 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0100 D International News; 0110 M Weekly Review, T-S National News; 0115 T-S Viewpoint; 0130 M Reports & Music, T-S News Bulletin; 0135 T-A Time Out (sports); 0140 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0150 M Breakthrough (science report).

RADIO NETHERLANDS

0100 S/M News; T-A Newsline; 0105 S Wide Angle (in-depth), M Europe Unzipped; 0125 S The Week Ahead (on RN), M Insight (commentary); 0130 S Amsterdam Forum (conversations), M Vox Humana (culture), T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0100 D RNZ News; 0105 S Feature, M-F In Touch with New Zealand (music, interviews, variety), A Eureka! (science)*; 0130 A Health Matters [or] Environment Matters.

[*may be preempted by live sport]

RADIO PRAGUE

0100 D News; 0105 S Magazine, M Mailbox, T-A Current Affairs; 0110 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts;

0115 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO SLOVAKIA INTERNATIONAL

0100 D News; 0105 S Front Page Review (Slovak press), M Weekly Newsreel T-A Topical Issue; 0110 S Various features, M Listeners' Tribune (letters, magazine, Slovak music), T Insight Central Europe, W Tourism News or Environmental Update, H Business News, F Culture News or Back Page News (the offbeat), A Education, Science and Regional News.

RADIO UKRAINE INTERNATIONAL

0100 D News; 0110 S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); 0115 S The Whole World on the Radio Dial (DX program); 0130 S Hello From Kiev (listener letters/music), M Roots (culture & education); 0145 T-A Closeup (current issues).

VOICE OF AMERICA (News Now)

0100 T-A News and Reports; 0115 Focus (one news story in depth); 0123 T-A Sports; 0130 T-A News Headlines; 0133 T-F Business Report, A Our World (science magazine); 0145 T-F Dateline (daily short documentary); 0155 T-F Opinion Roundup.

VOICE OF VIETNAM

0100 D News; 0105 D Current Affairs; 0110 S Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0115 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0120 S Music, A Literature and Arts.

WBCQ, Maine

7415 kHz.: 0100 S Different Kind of Oldies Show, M Radio New York International, W/A Allan Weiner Worldwide.

RTE, Ireland

0130 S Saturday View, M This Week with Gerald Barry, T-A 5-7 Live (top news of the day).

VOICE OF AMERICA (Special English)

0130 T-A News; 0140 T Agriculture Today, W/H Science Report, F Environment Report, A In the News; 0145 T Science in the News, W Explorations, H Making of a Nation, F American Mosaic; A American Stories.

0200 UTC 9pmET/6pmPT**BBC WORLD SERVICE (am)**

0200 D News; 0206 S Play of the Week, M The Ticket (global arts survey), T Health Matters, W Go Digital, H Discovery (science), F One Planet (ecology), A Science in Action; 0232 T Quiz or panel game, W Music Review, H/A Westway, F The Word (writing & writers) [exc. 27th, World Book Club (discussion)]; 0245 H Heart & Soul (beliefs & values), A What's the Problem (advice).

RADIO AUSTRALIA

0200 D News; 0205 S Margaret Throsby (interviews and music), A Background Briefing (documentary); 0210 M-F The World Today (ABC Radio flagship news program); 0255 T-F Stock Market Report, A Reporter's Notebook.

[Special service: 0205 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO AUSTRIA INTERNATIONAL

0205 S/M Insight Central Europe; 0215 T-A Report from Austria; 0225 S/M Listener Letters; 0235 S/M Insight Central Europe; 0245 T-A Report from Austria; 0255 S/M Listener Letters.

Shortwave Guide



RADIO BUDAPEST

0200 D News; 0205 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0220 A DX Corner.

RADIO CANADA INTERNATIONAL

0200 D News; 0205 S Business Sense, M Maple Leaf Mailbag (w/CIDX report bimonthly); 0210 T-A Canada Today (current events magazine); 0235 S/A Sci-Tech File, M/H Spotlight (arts & culture), T Media Zone (journalists discuss), W Maple Leaf Mailbag (w/CIDX report bimonthly), F Business Sense.

RADIO HABANA CUBA

0200 D International News; 0210 M From Habana (Cuban musicians), T-S National News; 0215 T-S Reports and music; 0230 M The Jazz Place or Top Tens, T-S News Bulletin; 0235 S World of Stamps, T-A Reports and music; 0250 S Cuban music.

RADIO KOREA INTERNATIONAL

0200 D News; 0210 S Worldwide Friendship (letters, DX news), M Korean Pop Interactive (requests), T-A News Commentary; 0215 T-A Seoul Calling (magazine); 0230 T Korea Today & Tomorrow (peninsular relations), W Korean Kaleidoscope (society), H Wonderful Korea (travelogue), F Seoul Report.

RADIO NEW ZEALAND INTERNATIONAL

0200 D RNZ News; 0205 S Feature*, A Home Grown (NZ music)*; 0208 M-F In Touch w/NZ (cont'd); 0230 A Musical Chairs (artist spotlight)*. [*may be preempted by live sport]

RADIO PRAGUE

0200 D News; 0205 S Magazine, M Mailbox, T-A Current Affairs; 0210 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0215 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL

0200 D Radio Newsreel; 0210 S The Week, M Focus, T-A Commentary; 0215 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; 0220 S RRI Encyclopedia, T Political Flash, W European Horizons; 0225 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0230 S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W W Mother Nature (ecology), H Visit Romania, A Practical Guide; 0235 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0240 S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0245 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0250 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO TAIWAN INTERNATIONAL

0200 D News; 0215 S News Talk, M Jade Bells & Bamboo Pipes (traditional music), T Culture Express, W Taiwan Today, H Discover Taiwan, F Taipei Magazine, A Groove Zone; 0230 S Hakka World (Hakka culture), T Trends, W Instant Noodles (the wacky), H Confucius & Inspiration

Beyond, F People; 0240 S Mailbag Time; 0245 M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate), A Kaleidoscope (life in Taiwan). [This schedule also airs at 0700 for western North America.]

VOICE OF RUSSIA

0200 D News; 0211 S/M Moscow Mailbag, T-A Commonwealth Update; 0230 D News in Brief; 0232 S Moscow Yesterday & Today, M Timelines, T Folk Box, W Jazz Show, H Musical Portraits, F Moscow Calling, A Christian Message from Moscow; 0246 F Music At Your Request; 0254 H Russia: People & Events.

WBCQ, Maine

7415 kHz.: 0200 S Marion's Attic (vintage recordings), M Radio New York International (cont'd), A Tasha Takes Control.

WHRA, Maine

7580 kHz.: 0230 S DXing with Cumbre.

RADIO SWEDEN

0230 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0245 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF VIETNAM

0230 D News; 0235 D Current Affairs; 0240 Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0245 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0250 S Music, A Literature and Arts.

0300 UTC 10pmET/7pmPT

BBC WORLD SERVICE (am)

0300 S/A News, M-F The World Today; 0332 S The Interview (trends), M World Business Review, T-A World Business Report; 0345 M Instant Guide (background), T/W/F/A Analysis, H From Our Own Correspondent.

CHINA RADIO INTERNATIONAL

0300 D News & Reports; 0310 S Report on Developing Countries; 0315 A Cutting Edge (sci/tech); 0320 S CRI Roundup; 0330 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0300 D News; 0305 S Verbatim (oral histories), A Rural Reporter; 0310 M-F Regional Sports Report; 0320 M-F Life Matters (social issues); 0330 S Jazz Notes, A Australian Country Style; 0354 Heywire (young rural Australian opinion). [Special service: 0305 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO BULGARIA

0300 D News; 0310 S Views Behind the News, M Folk Studio (Bulgarian folk music), T-A Events and Developments; 0320 T Sports; 0325 W-S Timeout for Music; 0330 T Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); 0335 T Answering Your Letters, W-M Keyword Bulgaria (Bulgaria and things Bulgarian); 0345 S Radio Bulgaria Calling (for radio hobbyists), W Magazine Economy, H Arts and Artists, F History Club, A The Way We Live.

RADIO HABANA CUBA

0300 D International News; 0310 M Weekly Review, T-S National News; 0315 T-S Viewpoint; 0330 M Reports & Music, T-S News Bulletin; 0335 T-A Time Out (sports); 0340 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0350 M Breakthrough (science report).

RADIO NEW ZEALAND INTERNATIONAL

0300 S/A* RNZ News, M-F Pacific Regional News; 0305 S Sunday Drama* (radio plays), A Home Grown (cont'd from 0205); 0308 M-F Dateline Pacific; 0330 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent. [*may be preempted by live sport]

RADIO TAIWAN INTERNATIONAL

0300 D News; 0315 S Hakka World (Hakka culture), M Taiwan Economic Journal, T Jade Bells & Bamboo Pipes (traditional music), W New Music Lounge, H Instant Noodles (the wacky), F Formosa Outlook, A News Talk; 0325 A Kaleidoscope (life in Taiwan); 0330 S Asia Pacific (from Radio Australia), M Stage, Screen & Studio, H Life Unusual, F Bookworm; 0340 A Mailbag Time; 0345 M-F Let's Learn Chinese (M/W/F elementary, T/H intermediate).

VOICE OF AMERICA, Africa Service

0300 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); 0323 S/A Sports; 0330 D News Headlines; 0333 S Encounter (topical debate), M-F Business Report, A Our World (ecology, science & technology); 0345 M-F Dateline (documentary); 0355 M-F Opinion Roundup.

VOICE OF RUSSIA

0300 D News; 0311 M Sunday Panorama, T-S News & Views; 0330 D News in Brief; 0332 S Songs from Russia, M/F Russian by Radio, T Kaleidoscope (Russian events), W Musical Portraits, H Moscow Yesterday & Today, A Audio Book Club (Russian lit.); 0346 S You Write to Moscow; 0354 S/W Russia: People & Events.

WBCQ, Maine

7415 kHz.: 0300 S Alan Sane ("pirate" radio), M Radio New York International (cont'd).

WHRI, Indiana

5745 kHz.: 0330 M DXing with Cumbre.

WRMI, Florida

7385 kHz.: 0300 S Wavescan; 0330 S Viva Miami, M Wavescan.

WWCR, Tennessee

5070 kHz.: 0300 S DX Partyline; 0330 S World of Radio.

KWHR, Hawaii

17510 kHz.: 0300 M DXing with Cumbre.

RADIO BUDAPEST

0330 D News; 0335 S Insight Central Europe; M Europe Unlimited (trade) or Heading for Hungary (travel) or Spotlight (culture) or And the Gatepost (letters), T-A Hungary Today (current events magazine); 0350 A DX Corner.

RADIO SWEDEN

0330 S Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th), M In Touch with Stockholm (listener contact-1st)/Sounds Nordic (rock music-exc. 1st), T-A Sixty Degrees North (regional report); 0345 T Sports Scan, W Close Up (profiles of Swedes-1st), F Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

Shortwave Guide



Heart Beat (health-3rd)/The S-Files (things Swedish-4th), A Review of the Newsweek.

VOICE OF VIETNAM

0330 D News; 0335 D Current Affairs; 0340 Su Weekly Review, M Sunday Show, T/W/F/A Press Review, H Talk of the Week; 0345 T Vietnam: Land & People, W Culture & Society, H Letterbox, F Vietnam Economy, A Rural Vietnam; 0350 S Music, A Literature & Arts.

0400 UTC 11pmET/8pmPT

BBC WORLD SERVICE (am)
0400 S World Briefing, M-A News; 0406 M Talking Point (phone-in)[taped S 1406], T-F Outlook (magazine), A Pick of the World (BBC's best); 0432 S Global Business; 0445 M-F Off the Shelf (book readings), A Write On (letters).

CHINA RADIO INTERNATIONAL

0400 D News & Reports; 0410 S Report on Developing Countries; 0415 A Cutting Edge (sci/tech); 0420 S CRI Roundup; 0430 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0400 D News; 0405 S All in the Mind (the brain), A The Music Show (classical); 0410 M-F Margaret Throsby (interviews and music); 0430 S The Lounge (interviews); 0455 M-F Perspective (commentary).

[Special service: 0405 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0400 D International News; 0410 M From Habana (Cuban musicians), T-S National News; 0415 T-S Reports and music; 0430 M The Jazz Place or Top Tens, T-S News Bulletin; 0435 S World of Stamps, T-A Reports and music; 0450 S Cuban music.

RADIO NETHERLANDS

0400 S/M News; T-A Newsline; 0405 S Wide Angle (in-depth), M Europe Unzipped; 0425 S The Week Ahead (on RN), M Insight (commentary); 0430 S Amsterdam Forum (conversations), M Vox Humana (culture, T Research File (science), W EuroQuest (Europe in context), H Documentary, F Dutch Horizons, A A Good Life (development).

RADIO NEW ZEALAND INTERNATIONAL

0400 S/A RNZ News, M-F Checkpoint (major domestic evening news magazine); 0410 S Religion feature or series, A Tagata O Te Moana (Pacific magazine); 0440 S Jazz Spotlight.

RADIO PRAGUE

0400 D News; 0405 S Magazine, M Mailbox, T-A Current Affairs; 0410 S Letter from Prague, M ABC of Czech (the language), W Czech Science, H Witness (eyewitness to history), A The Arts; 0415 S/W One on One (interview), M Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), T Talking Point (Czech issues), H Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), F Economic Report, A Stepping Out (Prague nightlife).

RADIO ROMANIA INTERNATIONAL

0400 D Radio Newsreel; 0410 S The Week, M Focus, T-A Commentary; 0415 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; 0420 S RRI Encyclopedia, T

Political Flash, W European Horizons; 0425 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0430 S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W Mother Nature (ecology), H Visit Romania, A Practical Guide; 0435 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0440 S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0445 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0450 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

RADIO UKRAINE INTERNATIONAL

0400 D News; 0410 S Ukrainian Diary (weekly review), M Music from Ukraine, T-A Ukraine Today (magazine); 0415 S The Whole World on the Radio Dial (DX program); 0430 S Hello from Kiev (listener letters/music), M Roots (culture & education); 0445 T-A Closeup (current issues).

VOICE OF AMERICA, Africa Service

0400 D News & Reports; 0415 M-F Focus (a topic in-depth); 0423 D Sports; 0430 S/A News Headlines, M-F Daybreak Africa (morning newsmagazine); 0433 S/A Main Street (life in America).

VOICE OF RUSSIA

0400 D News; 0411 S Music & Musicians, M This is Russia, T Musical Portraits, W/A Moscow Mailbag, H Science Plus, F Newmarket; 0430 D News in Brief; 0432 M Moscow Calling, T/H/A The River of Time, W Guest Speaker, F Russian history/culture; 0447 W Ladies of Character.

VOICE OF TURKEY

0400 D News; 0410 D Press Review; 0415 S Outlook, M Tunes Spanning Centuries, T Last Week, W Live From Turkey, H Review of the Foreign Media, F Big Powers & the Armenian Problem, A Archaeological Settlements in Turkey; 0420 S The Stream of Love or DX Corner, T Hues & Colors of Anatolia, H Letterbox; 0425 M/A Music, F In the Wake of a Contest; 0430 S/T Music; 0435 S Turkish Arts, M Turks in the Mirror of Centuries, T From Past to Present, H Turkey's Off the Beaten Track Sites, F The Culture Parade, A The Travel Itinerary of Anatolia.

KWHR, Hawaii

17780 kHz.: 0430 S DXing with Cumbre.

WBCQ, Maine

7415 kHz.: 0400 S You Are What You Think (satire), M Radio New York International (cont'd).

WHRA, Maine

7580 kHz.: 0430 A DXing with Cumbre.

WHRJ, Indiana

7315 kHz.: 0430 M DXing with Cumbre.

WRMI, Florida

7385 kHz.: 0400 S IBC Radio Network, M Old Time Radio.

WWCR Tennessee

5070 kHz.: 0400 S Spectrum (communications discussion).

0500 UTC 12mET/9pmPT

BBC WORLD SERVICE (am)
0500 D World Briefing; 0520 D Sports Roundup; 0532 S Reporting Religion, M-F The World Today, A People & Politics.

CHANNEL AFRICA, South Africa

0500 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

CHINA RADIO INTERNATIONAL

0500 D News & Reports; 0510 S Report on Developing Countries; 0515 A Cutting Edge (sci/tech); 0520 S CRI Roundup; 0530 S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

0500 D News; 0505 S The Europeans, A The Music Show (cont'd); 0510 M-F Pacific Beat (Pacific islands magazine with regional sports report @ 0530); 0530 S The Ark (religious history); 0549 S The Pulse (Aussie music now).
[Special service: 0505 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0500 D International News; 0510 M Weekly Review, T-S National News; 0515 T-S Viewpoint; 0530 M Reports & Music, T-S News Bulletin; 0535 T-A Time Out (sports); 0540 S/W DXers Unlimited, M Mailbag Show, T/H/F Caribbean Outlook, A Weekly Review; 0550 M Breakthrough (science report).

RADIO JAPAN - NHK WORLD

0500 D News; 0510 S Pop Joins the World, A Hello from Tokyo (listener contact); 0515 M-F 44 Minutes (magazine).

RADIO NEW ZEALAND INTERNATIONAL

0500 D RNZ News; 0507 S Mana Korero (Maori magazine), M-F Worldwatch & Pacific Report, A The Mix ('live' music acts); 0530 M Letter from America (Alistair Cooke); 0545 M-F Storytime.

RVi, Belgium

0500 S Music from Flanders, M Radio World, T-A News; 0504 T-A Flanders Today (incl. press review, reports & CD of the Week); 0508 M Tourism in Flanders; 0514 M Brussels 1043 (letters).

VOICE OF AMERICA, Africa Service

0500 S News, M-A News & Reports; 0523 M-A Sports Report; 0530 D News Headlines; 0533 S Issues in the News, M-F Business Report, A Press Conference USA; 0545 M-F Dateline (documentary); 0555 M-F Opinion Roundup.

VOICE OF NIGERIA

0500 S/A News Summary, M-F VON Scope (news magazine); 0505 S This Week on VON, A VON Link-up (music requests); 0530 D Moving On (variety magazine).

VOICE OF RUSSIA

0500 D News; 0511 S/M Musical Portraits, T/F Moscow Mailbag, W/A Science Plus, H Newmarket (business); 0530 D News in Brief; 0532 S Kaleidoscope, M Audio Book Club, T Music Around Us, W Moscow Yesterday & Today, H Folk Box, F Audio Book Club (Russian lit.), A Timelines; 0547 T Music At Your Request.

WBCQ, Maine

7415 kHz.: 0500 S Tom & Darryl (electronic media), M-A Amos 'n Andy; 0515 T-F Planet World News Tonight; 0545 M World of Radio.

WRMI, Florida

7385 kHz.: 0500 S Twilight Zone (science fiction), M Old Time Radio (cont'd.).

WWCR, Tennessee

5070 kHz.: 0500 S Cyber Line (digital communications).

Shortwave Guide



0600 UTC 1amET/10pmPT

CHANNEL AFRICA, South Africa

0600 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

DEUTSCHE WELLE

0600 D News; 0605 S Inside Europe, M Mailbag, T-A Newslink Africa; 0630 T Insight (international affairs), W World in Progress (development), H Money Talks, F Living Planet, A Spectrum (sci-tech); 0445 T Business German.

RADIO AUSTRALIA

0600 D News; 0605 S The Arts on RA, A Verbatim (oral histories); 0610 M-F Regional Sports Report; 0620 M Ockham's Razor (science opinion), T In Conversation (about science), W Lingua Franca (about language), H The Ark (religious history), F The Makers (artists); 0630 S Hit Mix (pop/rock), A In Conversation; 0635 M Hit Mix, T Music Deli (diverse world/folk), W Jazz Notes, H Australian Country Style, F The Lounge (interviews).

[Special service: 0605 S/A Grandstand (live sports action) on 9660, 12080, 17580, 21725 kHz. only.]

RADIO HABANA CUBA

0600 D International News; 0610 M From Habana (Cuban musicians), T-S National News; 0615 T-S Reports and music; 0630 M The Jazz Place or Top Tens, T-S News Bulletin; 0635 S World of Stamps, T-A Reports and music; 0650 S Cuban music.

RADIO JAPAN - NHK WORLD

0600 D News; 0610 S Weekend Square (Japanese life), M-F Songs for Everyone, A Pop Joins the World; 0615 M-F Asian Top News (headlines from region's radio); 0625 M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; 0654 S Japan: Take Five.

RADIO NEW ZEALAND INTERNATIONAL

0600 S/A RNZ News, M-F Checkpoint (repeat of 0400); 0604 S One in Five (disability issues), A Saturday Night with Peter Fry (variety); 0635 S This Week in Parliament.

RADIO ROMANIA INTERNATIONAL

0600 D Radio Newsreel; 0610 S The Week, M Focus, T-A Commentary; 0615 S World of Culture, M Sunday Studio, T Pro Memoria (history), W Business Club, H Society Today, F Cards on the Table (debate) or The Romanian Next to You (interview), A Challenge for the Future or Terra 2001; 0620 S RRI Encyclopedia, T Political Flash, W European Horizons; 0625 S Roots (culture/traditions), M Romanian by Radio, T/H/A Business Update, W Tourist News, F Listeners' Letterbox; 0630 S Radio Pictures, M Romanian Itineraries, T Pulse of Transition, W W Mother Nature (ecology), H Visit Romania, A Practical Guide; 0635 S Romanian Itineraries, M Listeners' Letterbox, T Performing Arts, W Youth Club, H Partners in a Changing World, A Cultural Survey; 0640 S, Bucharest Along the Centuries, T Pages of Romanian Literature, W/F Skylark (folk music), H Stage and Screen, A Spectator (voice of the people); 0645 S DX Mailbag, T Romanian Hits, H Romanian Musicians, A Romanian Folk Music At Its Best; 0650 M Romanian Folk Music At Its Best, T Sports Roundup, W Athlete of the Week, H Sports Club, F Football Flash, A Sports Weekend.

VOICE OF AMERICA, Africa Service

0600 S/A News & Reports, M-F Daybreak Africa (morning newsmagazine); 0623 S/A Sports; 0630 S/A News Headlines; 0633 S/A Main Street (life in America).

VOICE OF NIGERIA

0600 D Nigeria/Africa/World News (magazine); 0630 S In the News, A News Maker; 0645 A Window on Abuja.

KWHR, Hawaii

17780 kHz.: 0600 A DXing with Cumbre.

WBCQ, Maine

7415 kHz.: 0600 S Juliet's Wild Kingdom.

WRMI, Florida

7385 kHz.: 0600 S Lou Gentile (the paranormal), M IBC Radio Network.

1000 UTC 5amET/2amPT

BBC WORLD SERVICE (am)

1000 S/A News, M-F World Update; 1006 S From Our Own Correspondent, A Assignment; 1032 S Reporting Religion, A The Interview (trends).

BBC WORLD SERVICE (eas)

1000 S/A News, M-F World Update; 1006 S From Our Own Correspondent, A Assignment; 1032 S Play of the Week (radio theatre), M-F World Business Report, A The Interview (trends); 1045 M Instant Guide (background), T/W/F Analysis, H >From Our Own Correspondent..

RADIO AUSTRALIA

1000 D News; 1005 S Keys to Music (enjoying the classics), M-F Asia Pacific (regional current affairs), A Background Briefing; 1030 M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; 1055 A Reporter's Notebook.

RADIO NEW ZEALAND INTERNATIONAL

1000 D News; 1005 S Mediawatch, M-F Late Edition (the day's news), A Deep Purple (relaxing music/nostalgia); 1035 S Sunday Supplement.

VOICE OF AMERICA (News Now)

1000 D News and Reports; 1023 D Sports; 1030 D News Headlines; 1033 (no information from VOA available); 1055 A Government Editorial.

KWHR, Hawaii

11565 kHz.: 1000 A DXing with Cumbre.

1100 UTC 6amET/3amPT

BBC WORLD SERVICE (am)

1100 D World Briefing; 1105 M-F Caribbean Morning Report; 1110 M-F Sports Caribbean; 1115 M-F Caribbean Magazine; 1120 D British News; 1132 S Instant Guide (background), M-F World Business Report, A World Football; 1145 S-H Sports Roundup, F Football Extra.

BBC WORLD SERVICE (eas)

1100 S Play of the Week (cont'd from 1032), M-A News; 1106 M-F Outlook (magazine), A The Ticket (global arts survey); 1132 S Reporting Religion; 1145 M-F Off the Shelf (book readings).

CHINA RADIO INTERNATIONAL

1100 D Real Time Beijing (world/national/city news, business, sports, press, sci-tech, culture, showbiz, music, features); 1115 S China Beat (popular music), A China Roots (traditional music).

HCJB ECUADOR

1100 S Let My People Think, M-F Insight for Living, A Down Gilead Lane; 1130 S Renewing Your Mind, M-F Family Life Today, A Adventures in Odyssey.

RADIO AUSTRALIA

1100 D News; 1105 S Correspondents' Report, M-A Asia Pacific (regional current affairs); 1130 S The

Arts on RA, M-F Bush Telegraph (rural life), A The Europeans.

RADIO JAPAN - NHK WORLD

1100 D News; 1110 S Hello from Tokyo (listener contact), M-F Songs for Everyone, A Pop Joins the World; 1115 M-F Asian Top News (headlines from region's radio); 1125 M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO KOREA INTERNATIONAL

1130 D News; 1140 S Korean Pop Interactive (requests), M-F News Commentary, A Worldwide Friendship (letters, DX news); 1145 M-F Seoul Calling (magazine).

RADIO NETHERLANDS

1100 S Aural Tapestry (culture), M EuroQuest (Europe in context), T A Good Life (development issues), W Dutch Horizons, H Research File (science), F Documentary, A Amsterdam Forum (conversations); 1130 S Dutch Horizons, M Research File, T/A Music 52-15 (international music), W Documentary, H Aural Tapestry, F A Good Life.

RADIO NEW ZEALAND INTERNATIONAL

1100 S/A RNZ News, M-F Pacific Regional News; 1105 S/A Forces Programme (for NZ personnel serving in PNG & E. Timor); 1108 M-F Dateline Pacific; 1130 M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WWCR, Tennessee

5070 kHz.: 1130 A World of Radio.

1200 UTC 7amET/4amPT

BBC WORLD SERVICE (am)

1200 D Newshour; 1205 M-F Caribbean Business; 1210 M-F Caribbean Morning Report 2nd Edition; 1220 M-F Caribbean Magazine; 1230 M-F Newshour (cont'd.).

BBC WORLD SERVICE (eas)

1200 D Newshour.

HCJB ECUADOR

1200 S Moody Presents, M-F Precept, A Hour of Decision; 1215 M-F Proclaim; 1230 S The Living Word, M-F Renewing Your Mind, A DX Partyline.

RADIO AUSTRALIA

1200 D News; 1205 S The Spirit of Things (spiritual matters), M-H Late Night Live (discussion & interviews), F Sound Quality (innovative music), A The Music Show (classical); 1225 S The Pulse (Aussie music now).

RADIO KOREA INTERNATIONAL

1200 S Korean Pop Interactive (cont'd), M-F Seoul Calling (cont'd), A Worldwide Friendship (cont'd); 1215 M Korea Today & Tomorrow (peninsula issues), T Korean Kaleidoscope (Korean society), W Wonderful Korea (tourism), H Seoul Report (interviews).

RADIO NETHERLANDS

1200 S/A News, M-F Newline; 1205 S Wide Angle (in-depth), A Europe Unzipped; 1225 S The Week Ahead (on RN), A Insight (comment); 1230 S Vox Humana (culture), M Research File (science), T EuroQuest (Europe in context), W Documentary, H Dutch Horizons, F A Good Life (development issues), A Amsterdam Forum (conversations).

RADIO NEW ZEALAND INTERNATIONAL

1200 S-F RNZ News, A Forces Programme (cont'd.); 1205 S Sportsworld (recap magazine), M-F Late Edition.

Shortwave Guide



RADIO SWEDEN

1230 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1245** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

1300 UTC 8amET/5amPT

BBC WORLD SERVICE (am)

1300 D News; **1306** S Passport Please (national identity-1/25, 2/1, 8/), Documentaries (2/15, 22, 29), M-F Outlook (magazine), A Pick of the World (BBC's best); **1332** S In Praise of God; **1345** M-F Off the Shelf (book readings), A Write On (letters).

BBC WORLD SERVICE (eas)

1300 D News; **1301** A In Concert (performances); **1306** S From Our Own Correspondent, M Age of Empire (America in the modern world), T Masterpiece (arts ideas), W Passport Please (national identity-1/21, 28; 2/4), Documentaries (2/11, 18, 25), H Assignment, F Sports International; **1332** M-F British News; **1345** S Reporting Religion, M-H Sports Roundup, F Football Extra.

CHANNEL AFRICA, South Africa

1300 S/A Channel Africa Extra (weekend variety magazine).

CHINA RADIO INTERNATIONAL

1300 D News & Reports; **1310** S Report on Developing Countries; **1315** A Cutting Edge (sci/tech); **1320** S CRI Roundup; **1330** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1300 D News; **1305** S The Science Show, M-F The Planet (diverse music from around the world), A The Music Show (cont'd); **1355** S Perspective (commentary).

RADIO CANADA INTERNATIONAL

1300 M-F News; **1305** M-F The Current (current affairs-joined in progress).

RADIO NEW ZEALAND INTERNATIONAL

1300 S/A RNZ News, M-F Pacific Regional News; **1305** S Tagata o te Moana, A New Music Releases; **1308** M-F Dateline Pacific; **1330** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

RADIO SWEDEN

1330 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1345** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WHRI, Indiana
15105 kHz.: **1330** A DXing with Cumbre.

WRMI, Florida
15725 kHz.: **1300** A Shortwave Radio Network; **1330** S Viva Miami!

1400 UTC 9amET/6pmPT

BBC WORLD SERVICE (am)

1400 D News; **1406** S Talking Point (live phone-in), M Age of Empire (America in the modern world), T Masterpiece (arts ideas), W Passport Please (national identity-1/21, 28; 2/4), Documentaries (2/11, 18, 25), H Assignment, F Sports International, A Sportsworld (live action); **1432** M Music Feature, T White Label (new music), W Charlie Gillett (world music), H Music Biz, F John Peel (eclectic).

BBC WORLD SERVICE (eas)

1400 S/A News, M-F East Asia Today; **1406** S Talking Point (live phone-in), A Sportsworld (live action); **1432** M-F NewsHour.

CHANNEL AFRICA, South Africa

1400 S/A Channel Africa Extra (cont'd from 1300).

CHINA RADIO INTERNATIONAL

1400 D News & Reports; **1410** S Report on Developing Countries; **1415** A Cutting Edge (sci/tech); **1420** S CRI Roundup; **1430** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1400 D News; **1405** S Books & Writing, M-F Margaret Throsby (interview/music), A The Comfort Zone (design issues).

RADIO CANADA INTERNATIONAL

1400 D News; **1405** S The Sunday Edition, M-F Sounds Like Canada (Canadian magazine); A The House (Canadian politics).

RADIO JAPAN - NHK WORLD

1400 D News; **1410** S Pop Joins the World, A Weekend Japanology; **1415** M-F 44 Minutes (feature magazine); **1454** A Japan: Take Five.

RADIO NEW ZEALAND INTERNATIONAL

1400 D RNZ News; **1410** D Readings; **1430** T Bookmarks, W Diversions, H For a Smile, A This Week in Parliament; **1440** S/M On This Day, F Auckland Issues.

RADIO PRAGUE

1400 D News; **1405** S Mailbox, M-F Current Affairs, A Insight Central Europe; **1410** S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; **1415** S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

RADIO SWEDEN

1430 S In Touch with Stockholm (listener contact-1st)/ Sounds Nordic (rock music-exc. 1st), M-F Sixty Degrees North (regional report), A Network Europe (Europe magazine-1st week)/Sweden Today (2nd)/Spectrum (arts magazine-3rd)/Studio 49 (topical discussion-4th); **1445** M Sports Scan, T Close Up (profiles of Swedes-1st), H Nordic Lights (1st)/Green Scan (ecology-2nd)/Heart Beat (health-3rd)/The S-Files (things Swedish-4th), F Review of the Newsweek.

WRMI, Florida

15725 kHz.: **1400** S Wavescan, A Shortwave Radio Network (cont'd.).

WWCR, Tennessee

15825 kHz.: **1400** S Golden Age of Radio.

1500 UTC 10amET/7amPT

BBC WORLD SERVICE (am)

1500 D News; **1506** S Assignment, M Health Matters, T Go Digital, W Discovery (science), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); **1532** S People & Politics, M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. 26th, World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

BBC WORLD SERVICE (eas)

1500 D News; **1506** S Age of Empire (America in the modern world), M Health Matters, T Go Digital, W Discovery (research), H One Planet (ecology), F Science in Action, A Sportsworld (live action from 1406); **1532** S/M Quiz or panel game, T Music Review, W/F Westway, H The Word (writers & writings) [exc. 26th, World Book Club (discussion)]; **1545** W Heart & Soul (beliefs & values), F What's the Problem? (advice).

CHINA RADIO INTERNATIONAL

1500 D News & Reports; **1510** S Report on Developing Countries; **1515** A Cutting Edge (sci/tech); **1520** S CRI Roundup; **1530** S In the Spotlight (cultural magazine), M People in the Know (China's leading personalities), T Biz China, W China Horizons (China outside Beijing), H Voices from Other Lands, F Life in China, A Listeners' Garden.

RADIO AUSTRALIA

1500 D News; **1505** S Encounter (religion in Australia), M-F Asia Pacific (regional current affairs), A Educational series; **1530** M Health Report, T Law Report, W Religion Report, H Media Report, F The Sports Factor; **1555** S The Pulse (Aussie new music), A Business Weekend.

RADIO CANADA INTERNATIONAL

1500 D News; **1505** S The Sunday Edition (cont'd.), M-F Sounds Like Canada (cont'd., including **1530** F C'est La Vie (life in French Canada), **1545** T-F Out Front (first person views of life), A Vinyl Cafe).

RADIO JAPAN

1500 D News, **1505** S Hello from Tokyo (letters), M-F Songs for Everyone, A Pop Joins the World; **1515** M-F Asian Top News (reports from region's radio); **1525** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat.

RADIO NEW ZEALAND INTERNATIONAL

1500 S/A RNZ News, M-F Pacific Regional News; **1505** S/A Forces Radio; **1508** M-F Dateline Pacific; **1530** M New Music Releases, T Mailbox (letters & DX news) or RNZI Talk (station info), W Tradewinds (Pacific commerce), H The World in Sport, F Pacific Correspondent.

WRMI, Florida

15725 kHz.: **1500** S Shortwave Radio Network, A Shortwave Radio Network (cont'd.).

1600 UTC 11amET/8amPT

BBC WORLD SERVICE (am)

1600 S-F World Briefing, A News; **1606** A Sportsworld (live action from 1406); **1620** S-F British News; **1632** S World Business Review, M-F World Business Report; **1640** S The Instant Guide (background), M-F Sports Roundup; **1645** M/T H/F Analysis, W From Our Own Correspondent.

RADIO AUSTRALIA

1600 D News; **1605** S The National Interest (Australian politics), M-F Bush Telegraph (rural/outback Australia), A Hindsight (social history).

Shortwave Guide



RADIO AUSTRIA INTERNATIONAL

1605 S/A Insight Central Europe; 1615 M-F Report from Austria; 1625 S/A Listener Letters; 1635 S/A Insight Central Europe; 1645 M-F Report from Austria; 1655 S/A Listener Letters.

VOICE OF AMERICA, Africa Service

1600 S/A Nightline Africa (weekend newsmagazine), M-F News & Reports; 1615 M-F Focus (a topic in-depth); 1623 M-F Sports; 1630 M-F Africa World Tonight.

KWHR, Hawaii

9930 kHz.: 1600 S DXing with Cumbre.

WHRI, Indiana

13760 kHz.: 1600 A DXing with Cumbre.

WRMI, Florida

15725 kHz.: 1600 S/A Shortwave Radio Network (cont'd.).

1700 UTC 12nET/9amPT

CHANNEL AFRICA, South Africa

1700 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA

1700 D News; 1705 S Sound Quality (innovative music), M-F Australia Talks Back (phone-in), A The Spirit of Things (spiritual matters); 1755 M-F Perspective (commentary), A The Pulse (Aussie new music).

RADIO JAPAN - NHK WORLD

1700 D News; 1710 S Pop Joins the World, M-F Songs for Everyone, A Hello from Tokyo (listener contact); 1715 M-F 44 Minutes (feature magazine).

VOICE OF AMERICA, Africa Service

1700 S Reporters' Roundtable, M-A News; 1706 M-F Talk to America (global phone-in), A (no information available from VOA); 1730 S Music Time in Africa; 1755 A Government Editorial.

VOICE OF GREECE

1700 A All Greek to Me (Greek popular & traditional music)

SWISS RADIO INTERNATIONAL

1730 S/A Swiss Scene, M-F Newsnet; 1735 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); 1745 F Business Spotlight.

ALL INDIA RADIO

1745 M Light Music, T Karnataka Instrumental Music, W Folk Songs, H-S Devotional Music.

WBCQ, Maine

17495 kHz.: 1700 A Allan Weiner Worldwide.

WRMI, Florida

15725 kHz.: 1700 S Shortwave Radio Network, A Shortwave Radio Network (cont'd.).

1800 UTC 1pmET/10amPT

ALL INDIA RADIO

1800 D News; 1810 D Commentary; 1815 W Instrumental Music—Old Masters, H-T Hindustani Classical Vocal Music; 1830 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, F Focus (magazine-1st)/Horizon (literature-2nd/4th)/Music (3rd), A For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 1840 M DXers Corner (2nd/4th), T Film Songs of Yesteryears, W

Hits from Films, H Light Karnataka Music, F Light Instrumental Music; 1850 M Film Songs, F Light Music.

CHANNEL AFRICA, South Africa

1800 S Network Africa (week in review), M-F Dateline Africa (news magazine), A Channel Africa Sport.

RADIO AUSTRALIA

1800 D News; 1805 S-H Pacific Beat (Pacific islands magazine), F Pacific Review, A Best of 'Late Night Live' (interviews); 1830 F Country Breakfast (rural life).

RTE, Ireland

1830 S This Week with Gerald Barry, M-F 5-7 Live (top news of the day), A Saturday View.

VOICE OF AMERICA, Africa Service

1800 S/A News & Reports, M-F Africa World Tonight; 1805 S On the Line (US foreign policy), A Our World (science magazine); 1830 S/A News Headlines, W Straight Talk Africa (continental phone-in); 1833 S Encounter (issues debated), A On the Line (US foreign policy); 1855 S/A Government Editorial.

WBCQ, Maine

17495 kHz.: 1800 A Zombo's Mondo Record Party.

WRMI, Florida

15725 kHz.: 1800 S/A Changesurfer Radio; 1830 S/A Shortwave Report.

1900 UTC 2pmET/11amPT

ALL INDIA RADIO

1900 D News; 1905 D Press Review; 1910 S Women's World, M/W/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interviews-2nd/4th), H Panorama of Progress, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); 1920 S/M/W/F Film Songs, T Light Classical Music, H Light Instrumental Music, A Karnataka Classical Music; 1930 D Commentary; 1935 S/H/F Film Songs, M Karnataka Vocal Music, T Folk Songs, W/A Light Music.

RADIO AUSTRALIA

1900 D News; 1905 F Rural Reporter, A Australia All Over; 1910 S-H Pacific Beat (regional magazine w/Sport @ 1929); 1930 F Australian Country Style (music).

RADIO NETHERLANDS

1900 S Documentary, A Vox Humana (culture); 1930 S/A News; 1935 S Wide Angle (in-depth), A Europe Unzipped; 1955 S The Week Ahead (on RN), A Insight (commentary).

VOICE OF AMERICA, Africa Service

1900 S News & Reports, M-F News, A Hip Hop Connections (music); 1906 M-F Border Crossings (music—exc. W Straight Talk Africa cont'd.); 1923 S Sports; 1930 S Music Time in Africa (part 2), M-F World of Music, A News Headlines; 1933 A Press Conference USA.

VOICE OF NIGERIA

1900 S Youth Forum, M Our Cities, T Our Environment, W Who Are the Nigerians?, H Listeners' Letters, F Nigerian Scene, A Folktales; 1915 H Wheel of Progress, F Business Weekly, A Nigerian Newsletter; 1930 S Window on Abuja, M Perspectives, T African Monarchy, W Theatre on the Air, H Women and Development, F Weekend Magazine, A Time for Highlife; 1945 S From the Bookshelf, T Listeners' Letters.

SWISS RADIO INTERNATIONAL

1930 S/A Swiss Scene, M-F Newsnet; 1935 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A

Sounds Good (Swiss music-3rd/5th wk); 1945 F Business Spotlight.

WWCR, Tennessee

15825 kHz.: 1900 A Presidential Radio Address/Democratic Response.

2000 UTC 3pmET/12nPT

RADIO AUSTRALIA

2000 D News; 2005 F Pacific Review, A Australia All Over; 2010 S-H Pacific Beat (regional magazine w/Sport @ 2029), 2030 F The Buzz (technology).

RADIO NETHERLANDS

2000 S Vox Humana (culture), A Amsterdam Forum (conversations); 2030 S/A News; 2035 S Wide Angle (in-depth), A Europe Unzipped; 2055 S The Week Ahead (on RN), A Insight (commentary).

SWISS RADIO INTERNATIONAL

2000 S/A Swiss Scene, M-F Newsnet; 2005 A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); 2015 F Business Spotlight.

VOICE OF NIGERIA

2000 S News Bulletin, M-F Sixty Minutes, A African Hour; 2015 S Sports Roundup; 2030 S In the News.

VOICE OF AMERICA, Africa Service

2000 S/A Nightline Africa (weekend magazine), M-F Africa World Tonight.

ALL INDIA RADIO

2045 D Press Review; 2050 S/T Instrumental Music, M/F Folk Songs, W Light Music, H Classical Indian Vocal Music, A Regional Indian Devotional Music.

2100 UTC 4pmET/1pmPT

ALL INDIA RADIO

2100 D News; 2105 D Commentary; 2111 S Regional Film Songs, M/A Classical Indian Vocal Music, T Karnataka Vocal Music, W/H Instrumental Music, F Orchestral Music; 2120 S Sports Roundup (1st wk)/Feature (2nd)/Film Story (3rd)/Discussion (4th), M Faithfully Yours (letters), T Cultural Talk, W Radio Newsreel, H Panorama of Progress, F Focus (magazine-1st wk)/Horizon (literature-2nd/4th)/Indian Music (3rd), For Youth (1st)/Indian Classics (books-2nd)/From the Archives (3rd)/Quiz Time (4th); 2130 M DXers Corner (2nd/4th), T/W Film Songs, H Classical Half-Hour, A Old Film Songs; 2140 F Film Songs; 2145 M Film Songs; 2150 S Karnataka Vocal Music.

BBC WORLD SERVICE (am)

2100 D Newshour*.

[*Special service to the Caribbean on 5975, 11675, 15390 kHz.; 2115 M-F Caribbean Report. Special service to the Falklands on 11680 kHz.; 2130 T/F Calling the Falklands.]

DEUTSCHE WELLE

2100 News; 2105 S Hard to Beat (sport), M-F Newslink Africa, A Religion & Society; 2115 S Inspired Minds, A German by Radio; 2130 S Hits in Germany [or] Melody Time, M A World of Music, T Arts on the Air, W Living in Germany, H Cool (youth culture), F Focus on Folk, A Africa This Week; 2145 W Europe in Capitals.

RADIO AUSTRALIA

2100 D News; 2105 F Verbatim (oral history), A Australia All Over (cont'd.); 2110 S-H AM (morning news magazine); 2130 S Country Breakfast (rural life), M Earthbeat (ecology), T

Shortwave Guide



Innovations (new products), W Educational series, H All in the Mind (the brain), F In Conversation (about science); **2145** A Asia Sunday.

RADIO JAPAN - NHK WORLD

2100 D News; **2110** S Pop Joins the World, M-F Songs for Everyone, A Weekend Japanology; **2115** M-F Asian Top News (headlines from region's radio); **2125** M Japan Music Treasure Box, T Basic Japanese for You, W Japan Musicscape, H Brush Up Your Japanese, F Music Beat; **2154** A Japan: Take 5.

RADIO PRAGUE

2100 D News; **2235** S Letter from Prague, M-F Newsview, A Insight Central Europe; **2110** S Mailbox, M One on One (interview), T Witness (oral history), W ABC of Czech (language), H Economic Report, F The Arts; **2120** S Readings from Czech Literature, T Talking Point (Czech issues), W Czechs in History or Spotlight (travelogue), F Away from Politics (poetry).

VOICE OF AMERICA, Africa Service

2100 D News; **2106** S/A Jazz America, M American Gold, T Roots and Branches, W Classic Rock, H Top 20, F Country Hits.

WWCR, Tennessee

15825 kHz.: **2100** H DX Partyline, **2130** H World of Radio.

WHRI, Indiana

9495 kHz.: **2130** A DXing with Cumbre.

2200 UTC 5pmET/2pmPT

ALL INDIA RADIO

2200 D News; **2210** D Commentary; **2215** S Women's World, M/F Radio Newsreel, T Of Persons, Places & Things (1st/3rd wk)/Our Guest (interview-2nd/4th), W Book Review (1st)/Window on Science (2nd/4th)/Times & Lives (biography-3rd), H General Talk, A Mainly for Tourists (1st/3rd)/Indian Cinema (2nd)/On the Export Front (4th); **2225** D Film Tune.

BBC WORLD SERVICE (am)

2200 D News; **2201** A Play of the Week; **2206** S Passport Please (national identity-1/25, 2/1, 8)/Documentaries (2/15, 22, 29), M Health Matters, T Go Digital, W Discovery, H One Planet, F Science in Action; **2232** M Quiz or panel game, T Music Review, W/F Westway (drama serial), H The Word (writers & writings) [exc. 26th, World Book Club (discussion)]; **2245** W Heart & Soul (beliefs & values), F What's the Problem? [advice].

RADIO AUSTRALIA

2200 D News; **2205** F Asia Pacific (regional current affairs), A Correspondents' Report; **2210** S-H AM (morning news magazine); **2230** F AM Saturday (morning news magazine), A Music Deli (international); **2240** S-H Australia Wide (national report); **2254** A-H Perspective (commentary).

RADIO PRAGUE

2230 D News; **2235** S Mailbox, M-F Current Affairs, A Insight Central Europe; **2240** S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; **2245** S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

RVi, Belgium

2200 S Radio World, M-F News, A Music from Flanders; **2204** M-F Flanders Today (incl. press review, reports & 'CD of the Week'); **2208** S Tourism in Flanders; **2214** S Brussels 1043 (letters).

WBCQ, Maine

7415 kHz.: **2200** S Radio Free Euphoria, M Jean Shepherd, F Pan Global Wireless; **2230** F Pub Sungenis Project.

9330 kHz.: **2200** A Allan Weiner Worldwide.

WHRI, Indiana

5745 kHz.: **2200** S DXing with Cumbre.

WRMI, Florida

15725 kHz.: **2200** A Shortwave Radio Network.

2300 UTC 6pmET/3pmPT

BBC WORLD SERVICE (am)

2300 D The World Today; **2332** F Global Business, A The Interview.

CHINA RADIO INTERNATIONAL

2300 D News & Reports; **2310** A Report on Developing Countries; **2315** F Cutting Edge (sci/tech); **2320** A CRI Roundup; **2330** S People in the Know (China's leading personalities), M Biz China, T China Horizons (China outside Beijing), W Voices from Other Lands, H Life in China, F Listeners' Garden, A In the Spotlight (cultural magazine).

RADIO AUSTRALIA

2300 D News; **2305** F Country Breakfast (rural life), A All in the Mind (the brain); **2310** S-H Asia Pacific (regional current affairs); **2330** S Business Report, M The Europeans, T Rural Reporter, W The Arts on RA, H The Buzz (technology issues), F Hit Mix (pop/rock), A Innovations (new products).

RADIO AUSTRIA INTERNATIONAL

2305 S/A Insight Central Europe; **2315** M-F Report from Austria; **2325** S/A Listener Letters; **2335** S/A Insight Central Europe; **2345** M-F Report from Austria; **2355** S/A Listener Letters.

RADIO BULGARIA

2300 D News; **2310** A Views Behind the News, S Folk Studio (Bulgarian folk music), M-F Events and Developments (current affairs review); **2320** M Sports; **2325** M-F Timeout for Music; **2330** F Bulgarian Plaza (cultural magazine) or Walks and Talks (interesting places); **2335** M-F Keyword Bulgaria (Bulgaria and things Bulgarian), H Answering Your Letters; **2345** M Magazine Economy, T Arts and Artists; W History Club, H The Way We Live, F Radio Bulgaria Calling (for radio hobbyists).

RADIO CANADA INTERNATIONAL

2300 S/A The World This Weekend, M-F The World at 6; **2330** S Inside Track (sports anthologies) M-F As It Happens (interviews with newsmakers), A Madly Off in All Directions.

RADIO NEW ZEALAND INTERNATIONAL

2300 S-H Midday Report, F/S News; **2312** F Focus on Politics, A This Week in Parliament; **2333** F The Sampler (latest CDs), A Spectrum (life in NZ).

RADIO ROMANIA INTERNATIONAL

2300 D Radio Newsreel; **2310** S Focus, M-F Commentary, A The Week; **2315** S Sunday Studio, M Pro Memoria (history), T Business Club, W Society Today, H Cards on the Table (debate) or The Romanian Next to You (interview), F Challenge for the Future or Terra 2001, A World of Culture; **2320** M Political Flash, T European Horizons, A RRI Encyclopedia; **2325** S Romanian by Radio, M/W/F Business Update, T Tourist News, H Listeners' Letterbox, A Roots (culture/traditions); **2330** S Romanian Itineraries, M Pulse of Transition, T Mother Nature (ecology), W Visit Romania, F Practical Guide, A Radio Pictures; **2335** S Listeners' Letterbox, M Performing Arts, T Youth Club, W Partners in a Changing World, F Cultural Survey, A Romanian Itineraries; **2340** M Pages of Romanian Literature,

T/H Skylark (folk music), W Stage and Screen, F Spectator (voice of the people), A Bucharest Along the Centuries; **2345** M Romanian Hits, W Romanian Musicians, F Romanian Folk Music At Its Best, A DX Mailbag; **2350** S Romanian Folk Music At Its Best, M Sports Roundup, T Athlete of the Week, W Sports Club, H Football Flash, F Sports Weekend.

RADIO PRAGUE

2330 D News; **2335** S Mailbox, M-F Current Affairs, A Insight Central Europe; **2340** S ABC of Czech (the language), T Czech Science, W Witness (eyewitness to history), F The Arts; **2345** S Encore [or] Magic Carpet (both monthly) [or] Czech Books (biweekly), M Talking Point (Czech issues), T One on One (interview), W Czechs in History [or] Czechs Today (both monthly) [or] Spotlight (travelogue), H Economic Report, F Stepping Out (Prague nightlife).

SWISS RADIO INTERNATIONAL

2330 S/A Swiss Scene, M-F Newsnet; **2335** A Take 2; 1740 S Culture Zone (the arts-1st/3rd wk) or Out and About (Swiss places-2nd/4th wk), A Sounds Good (Swiss music-3rd/5th wk); **2345** F Business Spotlight.

VOICE OF TURKEY

2300 D News; **2310** D Press Review; **2315** S Tunes Spanning Centuries, M Last Week, T Live >From Turkey, W Review of the Foreign Media, H Big Powers & the Armenian Problem, F Archaeological Settlements in Turkey, A Outlook; **2320** M Hues & Colors of Anatolia, W Letterbox, A The Stream of Love or DX Corner; **2325** S/F Music, H In the Wake of a Contest; **2330** M/A Music; **2335** S Turks in the Mirror of Centuries, M From Past to Present, W Turkey's Off the Beaten Track Sites, H The Culture Parade, F The Travel Itinerary of Anatolia, A Turkish Arts.

WBCQ, Maine

5105 kHz.: **2300** M-F Radio Caroline (the original Europop radio station).

7415 kHz.: **2300** W World of Radio, F Pub Sungenis Project (cont'd), A Radio Timtron Worldwide; **2330** W Think Tank North America (the bizarre), H Uncle Ed's Musical Memories, F Wanton Display of Control & Disruption.

WHRI, Indiana

9495 kHz.: **2330** A DXing with Cumbre.

WWCR, Tennessee

12160 kHz.: **2300** S Travel Channel Radio.

WHRA, Maine

17650 kHz.: **2300** F DXing with Cumbre; **2330** A DXing with Cumbre.

Thank You ...

Additional Contributors to This Month's Shortwave Guide:

Rich D'Angelo, *NASWA Flash Sheet*; Ehard Goddijn Radio Netherlands; Glenn Hauser, Enid, OK, *DX Listening Digest, World of Radio*; Jose Jacob VU2JOS, India; Michael Murray, UK; Anker Petersen, *DX Window*; Harold Sellers, Canada, *ODXA/DX Ontario*; Adrian Sainsbury, Radio New Zealand Intl; Robert E. Thomas, Bridgeport, CT; Larry Van Horn, MT Asst. Editor, *BBC On Air*; *BCL News*; *BCDXC*; *CIDX*; *Cumbre DX*; *DX News*; *Fineware*; *Hard Core DX*; *NASWA Journal*; *Observer*; *Worldwide DX Club*.

Mil Monitoring in Brasstown

I have had quite a few requests from folks in and around the southeast United States asking if I could pass along some of the military air frequencies we hear in our local area. Well, without further ado, here is a sampling of some recent 225-400 MHz activity from *MT* headquarters in Brasstown, North Carolina.

225.150	USAF JStars (E-8) aircraft USAF Have Quick training channel – Nationwide	279.500 279.725 282.425 282.800 283.400 283.750 285.100 287.300 287.450 288.200 289.000 290.500 290.700 290.800 291.750 292.000 295.800 296.950 296.800 297.000 297.400 299.200 299.500 301.400 302.000 302.400 303.000 303.100 303.950 304.700 305.800 306.200 306.250 306.300 307.350 307.900 311.000 313.600 314.600 317.575	FAA Atlanta ARTCC Crossville, TN RCAG – Ultra High Altitude USAF AWACS working Shaw AFB, SC F-16s and NORAD Callsign: OAKGROVE – Southeast US Immigration and Customs Enforcement (ICE) Air-to-air/Air-to-ground (Aircraft Callsign: OMAHA) DoD Search and Rescue – Nationwide USMC VMFA (AW)-224 Air-to-air – MCAS Beaufort, SC (Callsign: HAWK) USAF Air Mobility Command (AMC) C-21 aircraft Air-to-air – Nationwide USN VAW-77 Squadron Common – NAS Atlanta/Dobbins AFB, GA USAF 117ARW/106ARS Command Post – Birmingham IAP, AL (Callsign: DIXIE) Have Quick communications – Nationwide USAF AWACS Tadil A and C voice coordination – Nationwide USMC VMFA-142 Air-to-air – NAS Atlanta/Dobbins ARB, GA FAA Atlanta ARTCC Montgomery, AL RCAG – High Altitude NORAD Southeast Air Defense Sector (SEADS) Discrete (Callsign: OAKGROVE) FAA Atlanta ARTCC Jasper, AL RCAG FAA Atlanta ARTCC Jonesville, SC RCAG – High Altitude USAF AMC Airlift Control Element (ALCE) Air-to-air – Nationwide USAF Aerial refueling established tracks: AR-633A/B Boomer <Primary> USAF AWACS voice communications – Nationwide NASA Space Shuttle Air-to-ground (AM) – Worldwide USAF AMC ALCE Air-to-air- Nationwide FAA Atlanta ARTCC Uniontown, AL RCAG – Birmingham MOA FAA Atlanta ARTCC Chattanooga, TN RCAG – High Altitude USN VFA-203 Blue Dolphins (F/A-18) Air-to-air – NAS Atlanta/Dobbins ARB, GA FAA Atlanta ARTCC Tri City, TN (Whitetop Mountain RCAG) – High Altitude USMC VMFA-142 Air-to-air – NAS Atlanta/Dobbins ARB, GA NORAD Southeast Air Defense Sector (SEADS) Discrete (Callsign: OAKGROVE) USAF 134ARW Command Post – McGhee-Tyson Airport (Knoxville TN) USAF AWACS Tadil A and C voice coordination – Nationwide USAF 33FW/58FS Air-to-air – Eglin AFB, FL USN VAW-77 Air-to-air – NAS Atlanta/Dobbins AFB, GA USMC VMFA (AW)-224 Squadron Common – MCAS Beaufort, SC FAA Atlanta ARTCC Anniston, AL RCAG – Low Altitude Discrete FAA Atlanta ARTCC Birmingham, AL RCAG – High Altitude FAA Memphis ARTCC Nashville, TN RCAG – Ultra High Altitude FAA Atlanta ARTCC Hickory, NC RCAG – Ultra High Altitude FAA Atlanta ARTCC Mt. Oglethorpe, GA RCAG – Low Altitude surface to 10,000 feet USAF ACC Wing Command Post – Worldwide <Primary> USAF AWACS Tadil A and C voice coordination – Nationwide Civilian Contractor Lockheed Martin flight test support – Nationwide USAF/USN Ground Controlled Approach – Dobbins AFB/NAS Atlanta
225.200	NORAD Southeast Air Defense Sector (SEADS) Discrete (Callsign: OAKGROVE)		
225.100	USAF Command Post – Nationwide	303.950	
252.200	USAF 94AW/700AS Squadrons Operations/Air-to-air - Dobbins ARB, GA	304.700	
252.500	USAF 94AW/700AS Air-to-air – Dobbins ARB, GA	305.800	
254.300	FAA Atlanta ARTCC Crossville, TN RCAG – Low Altitude Discrete	306.200	
254.350	FAA Atlanta ARTCC Athens, GA RCAG – Low Altitude	306.250	
254.450	FAA Dobbins ARB/Atlanta TRACON Approach/Departure	306.300	
255.400	FAA Flight Service Station – Nationwide	307.350	
255.725	Civilian Contractor Lockheed Martin flight test support – Nationwide	307.900	
259.100	FAA Memphis ARTCC Jackson, TN RCAG – Low Altitude Discrete	311.000	
259.700	NASA Space Shuttle Air-to-ground (AM) – Worldwide	313.600	
261.200	USAF AWACS Tadil A and C voice coordination – Nationwide	314.600	
261.500	FAA Atlanta ARTCC Birmingham, AL RCAG – Low Altitude	317.575	
262.450	USAF Have Quick training channel – Nationwide		
264.200	FAA Atlanta ARTCC Hampton, GA RCAG – Special Sector Navy Tactical Operations		
265.400	NORAD Atlanta area Combat Air Patrol (CAP) aerial refueling/Ground Controlled Intercept (GCI)		
266.300	Civilian Contractor Lockheed Martin flight test support – Nationwide		
269.100	FAA Atlanta ARTCC Owning, SC RCAG – High Altitude		
269.500	FAA Atlanta ARTCC Newport, TN RCAG – Low Altitude Discrete		
269.550	FAA Atlanta ARTCC Newport, TN RCAG		
270.600	FAA Atlanta ARTCC Chattanooga, TN RCAG – High Altitude		
271.100	USAF Tactical air control post – Nationwide		
272.000	USAF 4FTW/50FTS-41FTS Operations/Air-to-air – Columbus AFB, MS USAF Special Operations – Nationwide		
273.600	FAA Atlanta ARTCC Macon, GA RCAG – Low Altitude Discrete		
274.750	USAF		
275.200	Civilian Contractor Lockheed Martin flight test support – Nationwide		
275.350	USN Blue Angels flight demonstration team – Nationwide		
276.500	USAF Air refueling established tracks: AR-216 Boomer <Primary>		
276.675	USAF F-15 Flight demonstration team – Nationwide		
279.000	NASA Space Shuttle UHF Air-to-ground (AM) – Worldwide		
279.200	FAA Atlanta ARTCC Hampton, GA RCAG – Special Sector Navy Tactical Operations		



317.700 FAA Atlanta ARTCC Atlanta, GA (Austell RCAG) – Low Altitude
 317.950 USAF AWACS voice communications – Nationwide
 319.100 FAA Atlanta ARTCC Montgomery, AL RCAG – Ultra High Altitude
 319.250 FAA Atlanta ARTCC Owning, SC RCAG – Low Altitude
 319.400 USAF AMC ALCE Air-to-Air
 319.700 USAF Aerial refueling route AR-633A/B Boomer <Secondary>
 319.900 FAA Atlanta ARTCC Tri Cities, TN RCAG – Low Altitude Discrete
 320.600 USAF Checkup Air exercise frequency/AWACS Tadil A and C voice coordination – Nationwide
 321.000 USAF ACC Wing Command Post – Worldwide <Secondary>
 322.950 USAF Thunderbirds flight demonstration team – Nationwide
 323.000 FAA Atlanta ARTCC Augusta, GA RCAG – Low Altitude Discrete
 324.650 USAF AWACS voice communications – Nationwide
 327.150 FAA Atlanta ARTCC Athens, GA RCAG – Low Altitude
 327.800 FAA Memphis ARTCC Nashville, TN RCAG – Ultra High Altitude
 328.550 USMC VMFA-142 Air-to-air – NAS Atlanta/Dobbins ARB, GA (Callsign: GATOR)
 333.300 DoD Unofficial air-to-air common – Nationwide
 333.350 USN VFA-203 Blue Dolphins (F/A-18) Air-to-air – NAS Atlanta/Dobbins ARB, GA
 335.650 FAA Atlanta ARTCC Macon, GA RCAG – High Altitude
 335.575 USAF/USN Ground Controlled Approach – Dobbins AFB/NAS Atlanta
 335.900 USAF Air Force Material Command (AFMC) Air-to-air – Nationwide
 335.950 USAF Common air exercise frequency/AWACS voice communications – Nationwide
 336.900 USMC/USAF Various squadrons air-to-air – North/South Carolina
 337.850 USN VFA-203 Squadron Common – NAS Atlanta/Dobbins AFB, GA
 340.200 USMC VMFA-142 Squadron Common – NAS Atlanta/Dobbins AFB, GA
 USN/USMC Control Tower/Ground Control – Nationwide
 341.750 USAF AWACS Have Quick Timing (TOD) – Nationwide
 342.500 DoD Metro (Weather) – Nationwide
 343.550 USAF AFMC Air-to-air – Nationwide
 343.750 USAF Air Combat Maneuvering (ACM) Pass/Kill discrete frequency – Bulldog MOA, GA
 343.800 FAA Atlanta ARTCC Greensboro, NC RCAG – High Altitude
 344.600 DoD Metro (Weather) – Nationwide
 345.050 USMC VMFA-142 Air-to-air – NAS Atlanta/Dobbins AFB, GA
 345.400 Civilian Contractor Lockheed Martin flight test support – Nationwide
 349.400 USAF AMC Command Post – Nationwide
 350.325 FAA Atlanta ARTCC Birmingham, AL RCAG – Discrete
 350.575 USMC VMFA-122 Air-to-air – MCAS Beaufort, SC (Callsign: NICKEL)
 353.700 FAA Atlanta ARTCC Gadsden, AL RCAG – Low Altitude
 353.800 FAA Atlanta ARTCC Chattanooga, TN RCAG – Low Altitude Discrete
 FAA Memphis ARTCC Fayetteville, AR RCAG – High Altitude
 354.050 FAA Atlanta ARTCC Huntsville, AL RCAG – Ultra High Altitude
 354.700 USMC VMFA-224 Air-to-air – MCAS Beaufort, SC
 355.000 USAF Wideband FM channel paired with 267.600 – Nationwide
 355.100 USN VFA-203 Blue Dolphins (F/A-18) Air-to-air – NAS Atlanta/Dobbins ARB, GA
 355.150 USN VFA-203 Blue Dolphins (F/A-18) Air-to-air – NAS Atlanta/Dobbins ARB, GA
 357.600 FAA Atlanta ARTCC Columbus, GA RCAG – Low Altitude Discrete
 358.200 USAF Red Air exercise frequency
 360.200 USN/USMC Control Tower/Ground Control – Nationwide
 360.750 FAA Atlanta ARTCC Macon, GA RCAG – Low Altitude: surface to FL290
 363.100 FAA Atlanta ARTCC Chattanooga, TN RCAG – High Altitude
 363.875 USAF AFMC Air-to-air – Nationwide
 364.200 NORAD Airborne Interceptor Communications Common (AICC) – Nationwide
 364.800 FAA Jacksonville ARTCC – Tactical support use frequency (FL450)
 369.900 FAA Atlanta ARTCC – Tactical support use frequency (FL450)
 370.875 USAF/USN Tower – Dobbins ARB/NAS Atlanta, GA
 370.900 FAA Atlanta ARTCC Black Jack Mountain, GA RCAG (Marietta) – Low Altitude Discrete
 371.850 FAA Atlanta ARTCC Glade Springs, VA RCAG – Low Altitude Discrete
 371.950 FAA Atlanta ARTCC Hampton, GA RCAG – High Altitude
 372.200 USAF Pilot to Dispatcher (PTD) – Nationwide
 376.900 USMC VMFA-122 Air-to-air – MCAS Beaufort, SC (Callsign: NICKEL)
 377.050 FAA Atlanta ARTCC Mt. Oglethorpe, GA RCAG – Low Altitude Discrete
 379.525 USAF 94AW/700AS Command Post – Dobbins AFB/NAS Atlanta, GA
 380.150 FAA Atlanta ARTCC Hampton, GA RCAG – Ultra High Altitude
 380.350 FAA Atlanta ARTCC Foothills, GA (Toccoa) – High Altitude
 381.300 USAF ACC Command Post – Nationwide
 381.350 USAF AWACS working Shaw AFB, SC F-16s and NORAD Callsign: OAKGROVE – Southeast US
 381.650 FAA Atlanta TRACON Blackjack Mountain, GA Departure Control
 382.600 Civilian Contractor Lockheed Martin flight test support – Nationwide
 384.550 USAF F-15 Airshow Demonstration West frequency – Nationwide
 384.800 Civilian Contractor Lockheed Martin flight test support – Nationwide
 388.175 USAF AWACS/JStars JTIDS Coordination frequency – Nationwide
 396.900 USN/USMC VFA-203/VMFA-142 ACM Air-to-air – NAS Atlanta/Dobbins ARB, GA (Callsigns: Dolphins/Omars)
 399.760 Russian military navigation satellites (carrier only) paired with 149.910 MHz
 399.840 Russian military navigation satellites (carrier only) paired with 149.940 MHz
 399.920 Russian military navigation satellites (carrier only) paired with 149.970 MHz

400.000 Russian civilian navigation satellites (carrier only) paired with 150.000 MHz
 400.080 Russian military navigation satellites (carrier only) paired with 150.030 MHz

Legend:

AFB Air Force Base
 ARB Air Reserve Base
 ARTCC Air Route Traffic Control Center
 AWACS Airborne Warning and Control System
 DoD Department of Defense
 JSTARS Joint Surveillance Target Attack Radar System
 NAS Naval Air Station
 NASA National Aeronautics and Space Administration
 NORAD North American Aerospace Defense Command
 RCAG Remote Communications Air-Ground Facility
 SEADS Southeast Air Defense Sector
 TADIL Tactical Digital Information Links
 TRACON Terminal Radar Control
 USAF U.S. Air Force
 USCG U.S. Coast Guard
 USMC U.S. Marine Corps
 USN U.S. Navy

Frequency Changes

Ken Windyka reports that the Westover JARB (KCEF), Massachusetts, Tower frequency has changed from 348.4 to 348.750 MHz. Also the Westover Metro frequency has changed from 342.5 to 274.750 MHz.

And we have an update on the Fort Leonard Wood trunk frequencies we published in the December issue. Ken Cechura writes that 409.2375 MHz is not part of that system, but 410.2375 is a valid frequency. Those of you who monitor that trunk system please take note and update your files.

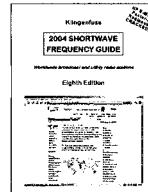
And that just about does it for this month's *Milcom* column. Until next time 73 and good hunting.

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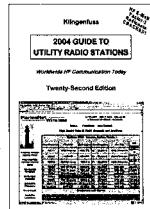


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Monitoring the Great Lakes

Gale force winds - Storm warning - Ferry drifting without power - You never know what you will hear when you monitor marine radio!

My name is Ron Walsh and this is the first of a regular column on marine monitoring. I hope to provide useful radio information for the ship enthusiast and radio monitor. I have been a Great Lakes marine enthusiast and ship photographer for about 50 years. My radio listening career began in 1959 with a Hallicrafters S-38.

My amateur radio license was obtained in 1976. I was originally VE3IDW but now hold the call VE3GO. My monitoring station is located in Kingston, Ontario, right at the junction of the St. Lawrence River and Lake Ontario. I am a relief captain on the local Thousand Island tour boats and a member of the Canadian Coast Guard Auxiliary.

We will start with frequencies for the Great Lakes region but plan to cover other areas in the future, especially as we begin to receive input from our readers. Although the Great Lakes marine frequencies are almost all VHF, many of you probably live within "earshot" of at least some radio signals, and there is still a great deal of interesting monitoring to be heard.

◆ Canadian Coast Guard

The Canadian Coast Guard stations are all consolidated and use phone lines to connect to their peripheral towers. Thus, VBR Prescott, Ontario, is called from the western end of Lake Ontario to the east of Cornwall, Ontario. The three operators use eight towers to cover Lake Ontario, Upper St. Lawrence River, Trent Canal and Lake Simcoe areas. They monitor channel 16 for emergencies along with several duplex channels. The channels alternate between the

peripheral towers, but channels 24 and 26) are the most common. A complete list of frequencies is available on the Canadian Coast Guard website at http://www.ccg-gcc.gc.ca/cen-arc/mets-sctm/vhf_e.htm.

They also monitor some simplex channels for Coast Guard operations. Channel 82A is most commonly used for search and rescue traffic. Channel 65A is also used. They also use the marine satellite service to monitor the arctic region, as they are a 24/7 operation.

The SAR (Search and Rescue) helicopters are dispatched from the Joint Rescue Co-ordination Centre (JRCC) in Trenton, Ontario. They use channel 82A when talking to the search vessels but will also be heard on channel 19A. It is useful to monitor these frequencies because they often report in when going on land missions as well. Like all aircraft their altitude gives them a great radio range.

One channel I often monitor is channel 83A, known as the Seaway Channel. This is usually used when something out of the ordinary has happened.

◆ A versus B

We should probably clarify the difference between A and B channels. Some channels are simplex, meaning you transmit and receive on the same frequency. Channel 6 is an example: transmit and receive is on 156.3 MHz. However, channel 26 is a duplex channel. The ship transmits on 157.3 MHz – the A side, while it receives on 161.9 MHz – the B side. The B frequency is always the higher frequency.

The shore station does just the reverse, transmitting on B and receiving on A. This was so the shore transmitter could be left on during phone calls and would not jam the ship transmissions.

Since the shore stations do so few phone calls any more, many of these duplex channels are now being used in the simplex mode. For example, Canadian marine coast stations provide a continuous marine broadcast for weather and notices to mariners. They use channel 83B and channel 21B for this service. If you want to try your French, channel 23B (161.75 MHz) is used.

Surprisingly, these channels have appeared on some Family Radio Service (FRS) radios which have a NOAA/

Environment Canada weather band capability. On standard marine radios, the International / US (Canada) switch selects the A or B channel. While in the International position all duplex channels listen on the B frequency and transmit on A. In the U.S. (and Canada) position some channels (for example, 82) transmit and receive on the A frequency. A table of Marine VHF frequencies will show you which channels are duplex.

If a vessel goes to channel 82 and you do not hear him, look on the A or lower frequency. Some shipping companies also use the A channels for private communication, particularly around ports, canals, etc. The Welland Canal locks use channel 17 upbound, and channel 66A downbound, according to the direction of vessels.

The United States Coast Guard uses an A frequency for their marine broadcasts. They use channel 22A after announcing the broadcast on channel 16. In my area, the Coast Guard also uses channel 21A, 23A and channel 81A. Buffalo Coast Guard radio has a tremendous signal and is heard all over the southern Great Lakes. I

Table 1: Maritime Frequencies

Channel Number - Frequency

09	- 156.450	Commercial
10	- 156.500	Commercial
11	- 156.550	Commercial
12	- 156.600	Port Operations
13	- 156.650	Port Operations
14	- 156.700	Commercial
14	- 157.700	Commercial
15	- 156.750	Environmental
16	- 156.800	Calling/distress
17	- 156.850	Admin/Enforcement
19	- 156.950	Commercial
21A	- 157.050	Coast Guard
22A	- 157.100	Coast Guard
23A	- 157.150	Coast Guard
24	- 161.800	Radio telephone
25	- 161.850	Radio telephone
26	- 161.900	Radio telephone
27	- 161.950	Radio telephone
28	- 162.000	Radio telephone
65A	- 156.275	Can. Coast Guard
66	- 156.325	Port Operations
70	- 156.525	DSC
81A	- 157.075	Coast Guard
82A	- 157.125	Coast Guard
81A	- 157.175	Coast Guard
84	- 161.825	Radio telephone
85	- 161.875	Radio telephone
86	- 161.925	Radio telephone
87	- 161.975	Radio telephone
83B	- 161.775	Coast Guard
21B	- 161.650	Coast Guard

* Not all channels used in all areas.



Coast Guard Cutter Bittern on a mission

would appreciate hearing from you which channels they use in other areas.

◆ Other active frequencies

The St. Lawrence Seaway Traffic control station monitors and controls shipping traffic on the Seaway. They use channels 11, 12 and channel 1. Port authorities often use these channels as well to direct traffic. As an example, the Hamilton Harbour Master is on channel 12.

Channel 13 is used for bridge-to-bridge communications by commercial vessels only. It is used for traffic control in the Upper St. Lawrence to avoid interference. As I write this, there is a lot of traffic on the Seaway, including a vessel being towed following an accident.

Around ports and canals, non-marine frequencies can also be of use. For example, the St. Lawrence Seaway has several frequencies for their own use – 170.71 MHz being a common one.

Frequencies in the 450 MHz band are often used aboard ships. Search around when you are in a port area. About five years ago, I heard about a shipping accident while listening on the Ontario Provincial Police Frequencies. I was out of range of the ship but could hear all the details on the police channel. Remember that many police agencies have marine units as well.

◆ Where to start

A must for monitoring is, of course, Channel 16. The emergency channel is still monitored on the Great Lakes. All distress communications and calling are heard here first. At the present time, the Canadian Government has no plans to introduce DSC (Digital Selective Calling) on the Great Lakes, but I am told the FCC may be considering the option. Channel 70 will be the DSC frequency. The American use of channel 9 for pleasure craft calling has not yet been adopted in Canada.

Ship to ship channels are also good targets. Channels 8 and 10 are the common channels for Commercial Shipping. The mail boat on the Detroit River uses channel 10. Channel 6 (156.3MHz) is often used by commercial ships as well as pleasure craft.

One target for my monitoring is the AIS (Automatic Identification System) instituted by the St. Lawrence Seaway this season. It transmits on marine frequencies and shows each ship's location, speed etc. This shows up on the electronic charts now used by many ships; we'll report more on this service in a future column.

You can also see many of the ships in the Seaway by going to the map at <http://www.greatlakes-seaway.com>. Look under Navigation and click on Vessel Transit. They do not list tankers, naval or Coast Guard vessels.

◆ Equipment

I use a Kenwood R-5000 with a VHF converter to monitor the active marine frequencies. I also have a Bearcat 780 HLT scanner to cover all the channels and services. I use a vertical and a discone as antennas. My Yaesu FT-897 also covers the marine frequencies and is used for longer-range reception.

From my location in Kingston, Ontario, I can receive signals from the eastern lake and

upper St. Lawrence well. I often get longer range when conditions are right. I have heard western Lake Ontario and as far as Montreal to the east on VHF.

A good predictor of VHF inversions are the NOAA (Environment Canada) weather frequencies. When I start hearing signals on frequencies not used in this area, I can be certain marine signals will come in from an increased distance as well.



◆ Gone but not forgotten

Like everyone, I miss the HF stations which once covered the lakes. WLC Rogers City was the last to go, but I also miss the private HF stations that some shipping lines had. Upper Lakes Shipping used to operate XJP52 on 4, 6, 8 and 16 MHz but it disappeared about a year before WLC. Our own VBH Kingston is also just a memory. All that remains are a few ground rods.

One good source for marine HF is on the amateur radio bands. For example, Ron, VA3RJC, is aboard the freighter *Algosteel* and I have asked him to give me information about his operating. He is often heard on 7055 and 3755 kHz USB.

My HF antennas are back up and I plan to monitor the marine HF bands here for interesting traffic. I am using a RACAL RA6778C and dipoles to get back into the HF scene. For those who are new to marine HF, 2182 kHz and 4125 kHz are good frequencies to begin your monitoring. 2182 is still a distress frequency and 4125 is also good for calls.

5696 kHz and 8983 kHz are very useful to monitor USCG activities on the east coast. CAMSLANT Chesapeake booms into this location. Coast Guard aircraft can also be heard. The USCG broadcasts weather on 2670 kHz. The Canadian Coast Stations use 2598 kHz and for broadcasts. All of the above are USB.

Those who like digital modes can try the various NAVTEX stations on 518 kHz. This is a SITOR mode signal for weather and notices to shipping.

I still have a listing for 2080 kHz for Lake Erie. I used to hear USCG helicopters from Traverse City, or Detroit, Michigan, on 5692 and 5696. I do not know if these frequencies are still in use and reader input would be appreciated.

◆ Resources and upcoming columns

For those of you who are interested in Great Lakes shipping, I recommend the web site <http://www.boatnerd.com>. This site lists the happenings on the lakes and information about the ships, canals etc.

I would like to hear from readers regarding good sources for maritime in-

formation, people to contact, and topics you would like me to research. I would be happy to make on the air contact with any amateur radio operators who are marine enthusiasts. I welcome any information, photographs and active frequencies for your area, as we plan to include a list of frequencies every month.

Plans for future columns include the Canadian Arctic and East Coast stations while the arctic stations are on the air; a visit to VBR Prescott Marine radio, and to JRCC Trenton to look into Canadian SAR procedures. VA3RJC has offered some information on amateur radio on a lake freighter. We'll go on board some of the vessels and see the communication equipment.

As I sign off, my radio is giving information about the vessel still being towed up the St. Lawrence River. I am also monitoring the end of the year rush of ocean vessels as everyone tries to deliver just one more cargo before the seaway freezes for the winter.

73s and good listening



VBR Prescott marine radio, pictured above and below.

VOA operates QRO!

QRO" is a ham radio abbreviation meaning "high power." Here in North America, we consider 50,000 watts "high power" on the AM broadcast band. Overseas AM broadcasters use transmitters that far exceed that magic 50,000-watt figure. One such broadcaster is the Voice of America. Charles Lewis S9SS engineers their transmitter facility in Sao Tome & Principe in West Africa; Charles forwarded a wealth of information about VOA's operation there.

The VOA operates three domestic-band stations in Sao Tome. The largest is a 600,000-watt (yes, 600 kilowatts!) station on 1530 kHz. 1530 uses two 334-foot towers to create a directional pattern covering most of Africa. VOA programs in English, French, Portuguese, and Hausa are broadcast. A second AM transmitter operates on 945 kHz at 20,000 watts; this carries the local Radio Nacional de Sao Tome e Principe programs. VOA also operates a 100-watt FM transmitter (atop a 2,000-foot mountain!) carrying the *VOA Music Mix* program. The latter two transmitters are intended for the local population within Sao Tome.

What does a 600,000-watt transmitter look like? See the picture. The first three cabinets house a single CQK-650-1 vacuum tube and the associated tuning networks. The fourth cabinet contains a high-power solid-state digital switch and RF impedance matching network. The rightmost cabinet contains control circuits.

In older AM transmitters, amplitude modulation was achieved by using the audio to control the high voltage applied to the final amplifier tubes. The "high level plate modulation" scheme is simple and works well, but it's relatively inefficient and lossy. When you have 600,000 watts floating around, losses add up to a LOT of heat to get rid of. (They also add up to a lot of wasted electricity purchased from the local utility. Or in VOA's case, locally generated with expensive diesel fuel.)

A different modulation system is used in the 600,000-watt Thomcast transmitter. Instead of a single high-voltage supply, the transmitter has 48 600-volt supplies in series. Each supply can be turned on or off by the control circuits. At a positive voice peak, all 48 supplies are turned on for a high voltage of roughly 30,000 volts. At a negative peak, they're all turned off for a high voltage of

zero. And when there is no audio – just a dead carrier – half the supplies are on. The 48 supplies are connected to the control circuits via fiber-optic lines; no other technology could handle the 30,000-volt potential differences!

Having only 48 voltage steps would lead to considerable noise and distortion in the transmitted signal, so one of the 600-volt supplies is pulse-duration modulated. It's turned on and off at a supersonic rate; the more power you want, the greater proportion of the time you leave it turned on. This fills in the gaps between the voltage steps.

To further improve efficiency, the 600,000-watt transmitter uses something called "controlled-carrier" operation. (If you were a ham back in the 1950s or 1960s and had a Heathkit DX-35, DX-40, or DX-60 transmitter, you're familiar with this system on a *much* smaller scale!) In AM transmission, a "carrier" signal is necessary for receivers to retrieve the audio. In most transmitters, the strength of the carrier is always the same. But it doesn't have to be. It only has to be stronger than the audio. The VOA transmitter (and the old Heathkit ham rigs!) automatically control the strength of the carrier, maintaining it just high enough to ensure receivers can properly retrieve the signal.

While the switched-mode modulation and controlled-carrier operation greatly improve efficiency, 600,000 watts is still a *lot* of power! 50,000-watt transmitters are usually air-cooled; a fan blows air across cooling fins on the tube (much like the CPU cooler in a computer). This isn't enough at the 600kW power level. To keep the tube cool, water is circulated through it. Water is also used to cool the tuning components, among other transmitter parts.

But remember: there's 30,000 volts on this tube! You don't just pump tap water through that kind of device. Tap water is a dangerous conductor at 125 volts, let alone

30,000. A special "de-ionizing system" is necessary. Some of the water circulating through the transmitter is passed through a tank containing a special resin; this filters out the ions. A meter is provided to keep track of how conductive the water is; if conductivity rises above the acceptable level, more water is diverted to the resin tank.

So with 600,000 watts, can VOA Sao Tome be heard in the U.S.? If you're on the Atlantic Coast, the answer is yes. A superficial scan of a few copies of the National Radio Club's "DX News" shows a handful of loggings of this station, with comments like "loud and clear, burying WSAI." Between 0300 and 0430 UTC, VOA-1530 should be parallel to a number of shortwave frequencies to Africa, including 4960, 6035, 6080, 7290, 7415, 9575, and 9885 kHz.

There's more of interest to the AM DXer at VOA Sao Tome, but there isn't much more space in this month's column. Stay tuned!

◆ Bits and Pieces

Expanded-band: We have another new expanded-band station on the air. KMMZ-1640 Enid, Oklahoma, has been testing with soft oldies and comedy. Patrick Griffith has already received a QSL from this station. The address is 316 East Willow, Enid OK 73702.

Whoizzit? Lawrence Puckett WB5CEW near Jackson, Mississippi, has been hearing a Spanish-language station on 850, carrying cumbia music. The station loops in the direction of Houston, Texas, and Lawrence has heard it identify in English with a K callsign. (Unfortunately interference made it impossible to hear the rest of the call.) DXers elsewhere have positively identified this station as KEYH in Houston.

Digital Comes to Mexico: Mexican broadcasters saw a comparative demonstration of the competing digital radio technologies at their CIRT (Cámara Nacional de la Industria de Radio y Televisión) convention in October in Mexico City. Eureka-147 tests are already underway in Mexico, and XM and Sirius satellite radio work south of the border. U.S. equipment makers lent XHFAJ-FM (91.3) IBOC digital equipment for the tests.

Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to dougsmit@monitoringtimes.com. Good DX!



The 600,000-watt Thomcast transmitter at VOA Sao Tome.

Why Do Pirates Operate?

Of all the questions that are sent into the *Outer Limits* column, by far the most common is a simple question, "Why do pirates operate, even though the government does not allow unlicensed broadcasting in virtually all countries?" This month, Artie Bigley sends in a typical answer to this question. He notes that a local pirate, **WUPT**, has been operating in the Fort Myers, FL, area on 91.9 MHz FM. The station has gained some notoriety, since it intentionally plays music that is considered obscene by commercial radio stations and the FCC. The Fort Myers *News-Press* has even dubbed this one "X Rated Radio."

Many pirates take to the airwaves to fill market niches like this one that are not being filled by regular licensed commercial broadcasters. The same motivation is there for many of the shortwave pirates that we cover in this column every month.

Pirates regularly complain that the USA government has allowed a handful of large corporations to buy a significant percentage of the commercial radio stations in the USA, making the fare audible on regular licensed broadcasters even blander than it was previously. Further, several of these broadcasters have been intentionally censoring programming on their stations for political purposes in recent months. Given this newly concentrated ownership of radio stations in the United States, the motivation leading to pirate broadcasting is actually increasing right now, despite the threat of governmental busts and fines.

Interestingly, in the case of **WUPT**, they are using the call letters of a now-silent UHF station that operated on Channel 25 in Crystal Falls, MI. That defunct station still had a web site on the internet as of column deadline at *MT*. You might want to see if that web site is still there by checking <http://www.northpine.com/broadcast/captures/mi/wupt.html> on your internet dial.

Yet another use of the WUPT call is an Alaska rock and roll band that also maintains a web site at <http://www.bands411.com/wupt/band.cfm?showmain=yes&bandid=1988> on the internet. Pirates inevitably claim that they are increasing the diversity of radio programming in North America, but the government and licensed commercial radio stations still complain that they broadcast without a license, and are therefore in violation of federal laws.

Such groups tend to feel that pirates are mainly symbolized by the QSL that we print here this month, from Fred Flintstone's old pirate station. Regardless of how you feel about

this political argument, pirate broadcasters can provide considerable entertainment for DXers looking to spice up their hours spent tuning their radio dials.

◆ Radio Oasen Cut

For several years an overtly fascist radio station, **Radio Oasen**, has broadcast in Denmark on 101.2 MHz FM. The station's quasi-clandestine National Socialist news and feature programming has been funded by the government of Denmark. This has been part of the Danish government's funding for a variety of noncommercial radio stations. The station has been broadcasting since 1996, but the government has announced that they will no longer be funding this particular station, given the fact that many groups have taken offense to the Nazi programming on the station. It is unclear if the station will remain on the air once the government subsidy disappears, since more than half of their operating budget was funded by the government of Denmark.

This situation shows clearly that governments can control the programming content of stations that they fund. That point is obvious, but as we have seen with **WUPT**, governments also regulate program content of stations through their allocation of licensed frequencies.

◆ World Music Radio Returning

World Music Radio, a classic pirate radio pioneer in Europe, primarily from the Netherlands in the 1960s, has announced its forthcoming return to shortwave. Somewhat in the vein of USA licensed broadcaster **WBCQ**, WMR claims that it will be the first licensed private shortwave radio station in Denmark. Noted European DXer Stig Hartvig Nielsen is supposed to play a major role in this one's return to the airwaves. They claim that their format will be classic rock and "world music," but full programming details are still being worked out.

In addition to their shortwave signal, the station says that it hopes to operate an streaming audio from their web site at <http://www.wmr.dk/> on the internet as well as an FM band transmitter in Denmark. They say that their address for correspondence is currently PO Box 112, DK-8900 Randers, Denmark.

Check out their web site from time to time for breaking news on this interesting development.

◆ Rhino Radio

Clandestines who broadcast some program-

ming in English are a rare breed. But, some North American DXers have been hearing the anti-Uganda **Rhino Radio** on 17870 kHz. Their program for more than a half hour before 1600 UTC often consists of English language anti-Uganda government broadcasts. Additional information on this one is available via their <http://www.radiorhino.org> internet web site.

◆ South American Pirates

Although their schedules are irregular, it always pays to check on weekends for the South American pirates **Radio Blandengue** and **Radio Cochiguaz**. Blandengue has been using variable frequencies around 14578 kHz, while Cochiguaz often uses their old standby of 11430 kHz. These pirates from another hemisphere can sometimes put surprisingly good signals into North America, and they welcome reports via the Santiago address below. Broadcasts are normally in either upper sideband or lower sideband mode, so you will want to check both possibilities. Another possibility to check out is Argentina pirate **Radio Bosques**, which has announced that it plans to move its broadcasts in 2003 to frequencies within the 7810-7870 kHz range.

◆ What We Are Hearing

Our readers heard all of these North American pirate broadcasters this month, with apparently somewhat reduced volumes of shortwave pirate broadcasting lately. All pirates operate on a sporadic schedule, but shortwave pirate broadcasting increases noticeably on weekends, and during major holiday periods. The new main North American pirate frequency of 6925 kHz, plus or minus 30 or 40 kHz, is the place to scan for the pirates. The old 6955 and 6950 kHz frequencies are increasingly abandoned by pirates because of licensed stations in China and Peru.

Grasscutter Radio- Normally this one is a rock music pirate, which is a real staple format in pirate radio today. (Uses grasscutterradio@yahoo.com e-mail)

Iron Man Radio- Scruffy's rock music station sometimes supplements its programming with an imaginary traffic report and occasional cameos from other pirates. (Belfast)

James Bond Radio- Several *MT* readers wrote in to report that they heard this apparently new station with rock and pop music and references to James Bond. Thus far the ID on this one is tentative, despite widespread loggings. (None known)

Old Turkey Radio- This one appeared with Thanksgiving holiday fare once again this year,

continued on page 79

SATELLITE SERVICES

MT TRANSPONDER GUIDE www.monitoringtimes.com/mtssg.html

All Frequencies MHz

Robert Smathers

robertsmathers@monitoringtimes.com

SES Americom Americom-1

C-Band - 103 degrees West longitude

1(H)	3720	Data Transmissions
2(V)	3740	SES-Americom (digital)
		Deutsche Welle TV
		Deutsche Welle Radio 1 (German)
		Deutsche Welle Radio 2 (English)
		Deutsche Welle Radio 7 (French)
		and other languages)
		ERT - Greece
		MegaCosmos
		ERAsport
		SES-Americom Occasional video services
3(H)	3760	Public Broadcasting Service Alaska/ Caribbean service (digital)
4(V)	3780	Fox Sports Net - Rainbow Network Communications (digital)
		Fox Sports Net Ohio
		Fox Sports Net Chicago
		Fox Sports Net New England
		Fox Sports Net Florida
		Fox Sports Net Alternate 1
		Fox Sports Net Alternate 2
5(H)	3800	Globecast (digital)
		Gol TV
		Wizebuys TV
		Globecast Occasional video feeds
		German TV
		Xtreme Shopping Network
		Latin Broadcasting Corp. Radio
		Radio Paz
		Deutsche Welle Radio
		WZMQ-FM Key Largo / WMFM-FM Key West - La Gran Cadena radio
6(V)	3820	WNBC-TV, New York City - Primetime 24 NBC (VC2+)
7(H)	3840	Pax Network Operations Center (digital)
		Pax Television - East
		Pax Television - Mountain
		Pax Television - Pacific
		Pax Television Occasional feeds
		The Worship Network
		Praise TV
		Faith Television
8(V)	3860	In-Demand Pay-Per-View (digital)
9(H)	3880	Occasional video / National Jewish Television (occ) / Housing and Urban Development Television (occ)
10(V)	3900	WKRN-TV, Nashville, TN - Primetime 24 ABC (VC2+)
11(H)	3920	Univision feeds (digital)
12(V)	3940	Wisdom Television (digital)
13(H)	3960	In-Demand Pay-Per-View (digital)
14(V)	3980	In-Demand Pay-Per-View (digital)
15(H)	4000	Total Living Network (digital) / CTN (digital)
16(V)	4020	Occasional video
17(H)	4040	(none)
18(V)	4060	Fox Sports Net - Rainbow Network Communications (digital)
		Fox Sports Net New York
		Fox Sports Net Bay Area
		Madison Square Garden Network
		Fox Sports Net Base
		Fox Sports Net Alternate 1
		Fox Sports Net Alternate 2
19(H)	4080	American Forces Network (digital) / Data Transmissions
20(V)	4100	MTV 2
21(H)	4120	Telefutura East, Telefutura Mountain, Telefutura Pacific (digital)
22(V)	4140	WSEE-TV, Erie, PA - Primetime 24 CBS (VC2+)
23(H)	4160	Occasional video
24(V)	4180	Data Transmissions

SES Americom Americom-1

Ku-Band - 103 degrees West longitude
(see January 2004 MONITORING TIMES)

SES Americom Americom-2

C-Band - 105 degrees West longitude
(Per current FCC rulemaking, the C-band portion is turned off)

SES Americom Americom-2

1(V)	11720	DISH Network services
2(H)	11740	DISH Network services
3(V)	11760	DISH Network services
4(H)	11780	DISH Network services
5(V)	11800	DISH Network services
6(H)	11820	(none)
7(V)	11840	DISH Network services
8(H)	11860	DISH Network services
9(V)	11880	DISH Network services
10(H)	11900	DISH Network services
11(V)	11920	DISH Network services
12(H)	11940	(none)
13(V)	11960	DISH Network services
14(H)	11980	DISH Network services
15(V)	12000	DISH Network services
16(H)	12020	DISH Network services
17(V)	12040	DISH Network services
18(H)	12060	DISH Network services
19(V)	12080	DISH Network services
20(H)	12100	(none)
21(V)	12120	(none)
22(H)	12140	DISH Network services
23(V)	12160	DISH Network services
24(H)	12180	DISH Network services

Telesat Canada Anik F1

1A(H)	3720	Occasional video
S1A(H)	3720	South-American beamed transponder
1B(V)	3740	Data Transmissions
2A(H)	3760	Canadian Broadcasting Corporation (CBC) Television (digital)
S2A(H)	3760	South-American beamed transponder
2B(V)	3780	Telesat Canada services (digital)
		Musimax
		Radio Mutual
		Magneotheque radio
		ASN
		RDS
		Canal Nouvelle
3A(H)	3800	Data Transmissions
S3A(H)	3800	South-American beamed transponder
3B(V)	3820	Occasional video
4A(H)	3840	(none)
S4A(H)	3840	South-American beamed transponder
4B(V)	3860	Occasional video
5A(H)	3880	Occasional video
S5A(H)	3880	South-American beamed transponder
5B(V)	3900	Cancom (digital) / Global Television (digital)
6A(H)	3920	Radio Canada (digital)
S6A(H)	3920	South-American beamed transponder
6B(V)	3940	Cancom (digital) / Aboriginal People's Television Network (digital)
7A(H)	3960	CBFT-TV (SRC Network - Montreal) (digital) / Data Transmissions
S7A(H)	3960	South-American beamed transponder
7B(V)	3980	Cancom (digital)
8A(H)	4000	Occasional video
S8A(H)	4000	South-American beamed transponder
8B(V)	4020	Occasional video
9A(H)	4040	Canadian Broadcasting Corporation (CBC) occasional video feeds (digital)
S9A(H)	4040	South-American beamed transponder
9B(V)	4060	Telesat Canada services (digital)
		Meteo Media
		TV5 USA
		TV5 France
		Blue Bonnet
		Occasional video
		Telemedia Radio - CITE Montreal
		Telemedia Radio - CKAC

Montreal
RDI
Radio Quebec

10A(H)	4080	Data Transmissions
S10A(H)	4080	South-American beamed transponder
10B(V)	4100	Telesat Canada services (digital)
		CTV Red Network
		CTV Blue Network
		CTV Green Network
		NewsWorld International
		The Weather Network
		Occasional video
11A(H)	4120	Occasional video
S11A(H)	4120	South-American beamed transponder
11B(V)	4140	Occasional video
12A(H)	4160	Canadian Broadcasting Corporation (CBC) occasional video services (digital)
S12A(H)	4160	South-American beamed transponder
12B(V)	4180	Occasional video

Telesat Canada Anik F1

T1(V)	11714	Star Choice DBS (digital)
T2(V)	11744	Star Choice DBS (digital)
T3(V)	11775	Star Choice DBS (digital)
T4(V)	11807	Star Choice DBS (digital)
T5(V)	11836	Star Choice DBS (digital)
T6(V)	11867	Star Choice DBS (digital)
T7(V)	11897	Star Choice DBS (digital)
T8(V)	11928	Star Choice DBS (digital)
T9(V)	11960	Star Choice DBS (digital)
T10(V)	11990	Star Choice DBS (digital)
T11(V)	12020	Star Choice DBS (digital)
T12(V)	12051	Star Choice DBS (digital)
T13(V)	12081	Star Choice DBS (digital)
T14(V)	12113	Star Choice DBS (digital)
T15(V)	12140	Star Choice DBS (digital)
T16(V)	12172	Star Choice DBS (digital)
T17(H)	11725	Star Choice DBS (digital)
T17S(H)	11725	South-American beamed transponder
T18(H)	11756	Star Choice DBS (digital)
T18S(H)	11756	South-American beamed transponder
T19(H)	11786	Star Choice DBS (digital)
T19S(H)	11786	South-American beamed transponder
T20(H)	11817	Star Choice DBS (digital)
T20S(H)	11817	South-American beamed transponder
T21(H)	11850	Star Choice DBS (digital)
T21S(H)	11850	South-American beamed transponder
T22(H)	11880	Star Choice DBS (digital)
T22S(H)	11880	South-American beamed transponder
T23(H)	11910	SRC occasional video feeds (digital)
T23S(H)	11910	South-American beamed transponder
T24(H)	11940	Canadian Broadcasting Corporation (CBC) occasional video feeds (digital)
T24S(H)	11940	South-American beamed transponder
T25(H)	11971	Star Choice DBS (digital)
T25S(H)	11971	South-American beamed transponder
T26(H)	12002	Star Choice DBS (digital)
T26S(H)	12002	South-American beamed transponder
T27(H)	12033	Star Choice DBS (digital)
T27S(H)	12033	South-American beamed transponder
T28(H)	12063	Star Choice DBS (digital)
T28S(H)	12063	South-American beamed transponder
T29(H)	12094	Star Choice DBS (digital)
T29S(H)	12094	South-American beamed transponder
T30(H)	12124	Star Choice DBS (digital)
T30S(H)	12124	South-American beamed transponder
T31(H)	12155	Star Choice DBS (digital)
T31S(H)	12155	South-American beamed transponder
T32(H)	12180	Star Choice DBS (digital)
T32S(H)	12180	South-American beamed transponder

Satellites Mexicanos Morelos 2

Ku-Band - 109.1 degrees West longitude	
T01K(H)	11764
T02K(H)	11888
T03K(H)	12012
T04K(H)	12136
	This satellite operates in an inclined orbit. No activity has been observed.

Try Longwave!

February can be a bleak month in many parts of North America. It's often very cold, windy and lacking in sunshine. If bad weather gets you down, why not turn to your radio hobby to brighten your outlook? With its many facets, monitoring can keep you busy for months without ever covering the same ground twice.

If you've decided on longwave for a change of pace, February is a great time to begin. Natural static levels are usually low, enabling even daytime signals to reach over respectable distances. Whether your interest is in navigation beacons (a mainstay for many), Lowfer experimenters, broadcasters or military signals, there is something for you on longwave. How do you get started?

◆ Getting on the Band

Many receivers of recent design include longwave coverage as a stock feature. Of the current crop of tabletop units, several receive down to 100 kHz, with some going as low as 30 kHz. (A few top-end receivers even dip down to 5 kHz!) My 12-year-old Drake R8 is typical of a tabletop receiver. It serves as my "workhorse" for longwave reception and tunes down to 100 kHz. Its coverage can be extended down to 5 kHz with an aftermarket, outboard converter. R8's, their successors, and many other tabletop receivers can often be found on the used market at reasonable prices.

If you have a good receiver that lacks longwave coverage, consider using an LF converter. Converters are an excellent way to get an older rig (or ham transceiver) onto the longwave band. They take a large swath of the LF spectrum and move it to a more convenient tuning range, such as the 80-meter ham band (3.5 to 4.0 MHz). These small units connect inline between the antenna and your existing radio, and require no modification to your rig whatsoever.

A word of caution is in order for transceiver owners: *Never transmit into a converter or it will be immediately destroyed.* To prevent damage, it's best to disconnect the microphone and key from your transceiver before installing the converter. Also, adopt a "hands-off" policy on the front panel "MOX" or "Tune" switch. (Trust me – I speak from costly experience.)

Converters are available from several sources. Three well-known firms offering them (or converter/antenna combinations) are: LF Engineering Co. (<http://www.lfengineering.com>), Palomar Engineers (<http://www.palomar-engineers.com>), and Ramsey Electronics (<http://www.ramseyelectronics.com>).

◆ Antennas

It's been said that a proper antenna is the single most important factor in your receiving setup. I agree with this, but if you're just starting out, don't be afraid to try your shortwave or ham antenna on longwave. The truth is, any hunk of wire, 50 feet or longer, will provide *some* reception on longwave. It may not provide great reception, particularly if you are in a high-noise environment, but it will get you started.

Hams often use an existing wire antenna for LW reception. In the case of a dipole, both legs of the antenna can be tied together in the shack by jumpering the center conductor and shield of the feedline. This increases the electrical length of the antenna and will provide considerably stronger signals. I started my LF exploration with an 80-meter dipole connected in this way. The results were very good.

As you delve further into the hobby, you'll probably want to try something more advanced, such as a directional loop or active antenna. These antennas provide even stronger signals and better signal-to noise ratios. LF Engineering Co. and Palomar Engineers, mentioned earlier, are two sources for these types of antennas.

◆ Identifying Signals

Sooner or later, you're going to want more details about the signals you hear. Fortunately, the keying speed on most beacons is so slow that you can simply jot down the dots and dashes and look up the letters on a Morse Code chart. Armed with an ID, you can look up the station's location in a directory or an online database. A useful online resource is <http://www.airnav.com>. Please note, however, that this site omits the important (to us) two-letter "compass locator" beacons.

While online resources are helpful, I'm unaware of any all-inclusive listing of North American beacons on the Web. Many listeners prefer a printed guide for reasons of convenience, and because they don't want to boot their computer for every DXing session. (A computer can also be a potential source of interference, especially when you're digging for weak signals.) Those interested in a printed guide may wish to consider the *BeaconFinder*, advertised elsewhere in this issue. Now in its 2nd edition, the guide has been completely revised to include additional charts, country lists, and other resources to help you ID your catch quickly.

◆ Reader News & Loggings

Brock Whaley (GA) checks in with an impressive list of loggings from the state of Georgia,



Mike Leahan (WI) sent this photo of SLY (344 kHz) near Hayward, WI. Although not visible here, the antenna consists of two parallel wires strung between the cross-arm utility poles. The shed houses the beacon transmitter.

plus a few nearby states. All signals were heard between 11 AM and 12 Noon Local time using a Sony 2010 receiver, Palomar Engineers converter, series tuner and a 120 foot longwire antenna.

Brock points out that all of these stations were heard on a regular speaker, without the need for headphones. It is interesting to note that six of the beacons listed have a voice broadcast in addition to their Morse IDs. Beacons with voice have become a rarity in recent years.

Selected Beacon Loggings

(All in GA unless otherwise noted)		
198	DIW	Dixon, NC
205	LNH	Millen
208	HOT	Homerville
212	OKZ	Sandersville
216	CLB	Wilmington, NC
221	BJT	Athens
234	EQQ	Newnan
241	GW	Greenwood, SC
244	DDA	Commerce
245	JYL	Sylvania
248	FRT	Spartenburg, SC
252	DB	Dublin
257	CEU	Clemson, SC
266	BR	Atlanta
271	PIN	Pine Mountain
278	EOE	Newberry, SC
280	MQW	McRae
285	JZA	Jasper
292	(DGPS Data)	Kensington, SC
301	(DGPS Data)	Macon
307	(DGPS Data)	Hacketsburg, AL
309	EEX	Swainsboro
316	FF	Peachtree City
319	(DGPS Data)	Savannah
329	CH	Charleston, SC
339	OP	Thomaston
341	AA	Thomson
344	FT	Atlanta
347	AJR	Cornelia
350	BEP	Perry
353	VV	Greensboro
356	BAX	Waynesboro
365	FKV	Gainesville
370	VOF	Covington
375	AT	Atlanta
379	BRA	Ashville, NC
380	UMB	Milledgeville
385	EMR	Augusta
388	OYD	Rome
392	JNM	Monroe
404	BMW	Winder
412	JHH	Griffen
415	DJD	Canton
419	TX	Lawrenceville
426	IZS	Montezuma
435	IYI	Washington

That's it for February. See you next month.

Microwaves Ain't Just for Cooking

When it comes to general amateur radio operations I tend to be a bit of a Luddite. My particular cup of ham radio tea is CW ragchewing on the lower HF bands. If my Grandfather had been a ham he would have been doing the same thing.

But amateur radio is supposed to be, in part, about experimentation and innovation. We are obliged by the very authority we have to operate to contribute to the advancement of the radio art.

Now if you tune around where I like to play you don't hear all that much innovation going on. Other than experiments in low power, DSP and "minimalist equipment" the low bands have been pretty much figured out from a technical standpoint. (Yeah, it's perfectly okay to go out and do something innovative and make me a liar... Just make sure you write about it here in *MT*.) The path to the future, for amateur radio, has always been punctuated by movement further up through the radio frequency spectrum.

Hams began to get serious about VHF communications not long after they got their privileges back after World War Two. (Today, just about every ham has a 2 meter handi-talkie clipped to their belt thanks to the work of those early innovators.) Since then it has been a constant quest to find new radio ground higher up the band. Today, hams who want to push the envelop do their thing in the *microwave* bands.

Now, when most of us think of the term microwave we get this vision of the box in the kitchen that we use to heat soup and make popcorn. Generally, the term microwave is applied to any signal above 1 GHz. The RF signals in that little electronic oven are in the microwave range (around 2.5 GHz to be exact, just above the 13 cm ham band). Hams also have a band in the 33 cm range at 902 MHz-928 MHz that most folks consider "close enough for government work" and if you operate up there you can consider yourself a bona fide microwaver.

With some geographical limitations that are not of consequence to this article, the microwave ham bands are as follows:

902 - 928 MHz
1.24-1.3 GHz
2.30-2.31 & 2.39-2.45 GHz
3.3 - 3.5 GHz
5.65 - 5.925 GHz
10 - 10.5 GHz
24 - 24.25 GHz

There are even higher frequency realms where practical hamming is still somewhat out of reach but if you want to try to get there it's perfectly legal at:

47.0 - 47.2 GHz
75.5 - 81.0 GHz
119.98 - 120 GHz
142 - 149 GHz
241 - 250 GHz

and anywhere above 300 GHz you can make a signal squeak!

Sound impossible? Remember that hams originally got their frequencies "below 200 Meters" because the so-called experts said they were impractical for commercial use. Who knows what some enterprising and tenacious amateur might come up with in the future?

◆ Modes Matter

The common modes of communication on these bands are CW and SSB with some experimentation in the newer digital communications modes. And while any ham with a Technicians Class ticket or higher can theoretically run a *full gallon* - 1.5 kW of power - you'll be hard pressed to find anyone using more than 20 watts, as cost for amplification in the microwave ranges can be prohibitive. Hams, instead, improve their odds by using high gain antennas, low loss cabling and connectors, and taking advantage of some tricks of the atmosphere such as tropospheric ducting and scattering.

The microwave bands are a place for cutting edge experimentation. You'll find very few *appliance operators* up this high. There are some commercial transceivers in the 1.2 GHz and even the 10 GHz and 24 GHz range, but beyond that, most hams either build their own gear or, more practically, use *transverters* to convert a signal in and out of more common transceivers (usually something in either the 10 meter or 2 meter range).

If you own an HF or VHF multimode transceiver, it is possible to get on to any of the microwave bands for a relatively reasonable cost. Transverters sell new in the neighborhood of \$200 and antennas are easily made or are of reasonable cost largely due to their small overall size. A station can be further improved with the addition of receiving preamplifiers and transmitter power amplifiers. So it is possible to start small, based around an existing ham shack, and grow into the microwave side of the hobby over time.

◆ Antenna Talk

Let's talk about those microwave band antennas for a bit because, for me, that is the most exciting area of ham experimentation related to the bands above 50 MHz. Since the antennas are physically small, it can be a lot of fun to try to improve upon existing ideas.

Most microwave enthusiasts lean toward an antenna design known as the *loop yagi*. While these are available commercially, many designs for home construction can be found. Also, since the antennas are small and light, it is fairly easy to group them in arrays of two, four or more to further increase gain.

The real fun comes when you move up through the 2.3 GHz region and traditional antenna designs begin to become impractical. Now you are in the world of parabolic dishes! Nothing says "serious ham radio" like your own microwave dish. Up in the 10 GHz range hams make use of *pyramidal horn* antennas to achieve gain and directivity.

Some people joke that ham radio up in these higher ranges has more to do with plumbing than with radio. I have to admit, it helps to be handy with a pair of tin snips. But the resulting equipment and its performance can be quite remarkable for home brew gear.

◆ Microwave Propagation

The signals in the microwave ranges are similar to those of most VHF and higher frequencies in that they are primarily line of sight. Traditional notions of ionospheric propagation get thrown out the window in the microwave world. Microwave signals are not refracted by the atmosphere. As I mentioned briefly earlier, microwavers stretch their signal paths mainly by way of a phenomena known as *tropospheric ducting*.

What happens here is that unique weather conditions can exist between two areas allowing unusually long distance communica-



Many hams use transverters to get their existing transceivers to operate in the microwave ranges

tion for these frequencies. Ducts in excess of 2500 miles have been utilized to set band records in the microwave regions. While the atmospheric science behind these ducts is still not fully understood, it is known that they are related to the activity and movement of large high pressure systems. Many microwave-savvy hams become as adept at reading weather maps as they are at tuning their rigs.

Given the "line of sight" nature of the microwave bands they also lend themselves to the practice known as *hilltopping*. Remembering that the higher your antenna is the longer your line of sight will be, many microwavers take their whole station out to higher elevations, often coordinating efforts with other hams going to other higher locations. This is very common during VHF contests where working the maximum number of *grid squares* can significantly improve an operator's overall score.

When you think things through, it's easy to see why many microwave stations are set up so that they can be easily used in the portable world as well. Most stations are limited to modest power, hence they are small in size and have reasonable power requirements. The antennas are physically small and relatively light. The shortest run of feedline possible is required to prevent signal loss.

Note: in the 10 GHz range and above, it is not uncommon for the transceiver to be mounted directly at the antenna, essentially eliminating the feedline. A fairly common sight for a microwave station is to have the rig and antenna mounted on a photographer's tripod for ease of manipulation. At the higher microwave ranges the antenna is likely to be either a dish or a horn, so this makes for a quick and easy way to operate.

❖ The Moon's the Limit

I would be remiss in not mentioning that the microwave bands up through 10 GHz have been used for Earth-Moon-Earth (EME) communication. This points to another effect related to microwave signal propagation. Microwave signals can reflect off of metallic surfaces. Signals have been known to be practically reflected off of the surface of water towers, traffic signs and even airplanes.

❖ Microwave Groupies

While the skills needed to set up a modest microwave station are within the scope of most hams, this is an aspect of the ham radio world that is seldom done solo. Given the nature of the microwave beast, it pays to be gregarious. It helps to get to know the other microwave enthusiasts in your area. After all, since it is a bit tricky to get a signal to travel great distances in the microwave ranges, it helps to set up schedules and make arrangements to get in the line of sight of one another's stations. Many major metropolitan areas have amateur clubs that emphasize VHF activity.

If you do find yourself *trawling* for signals in the microwave bands, you will be happy to know that the common practice is

to use standard *calling frequencies* generally agreed upon, based upon band and mode. Ideally, these frequencies will be places where active microwave hams in your regions will congregate and monitor. Once you've thrown out your callsign and gotten a response, it is then easy to agree to QSY to another place, freeing up the calling frequency for other amateurs.

A really great way to learn about the microwave bands as well as the other VHF and higher bands is to find your area VHF contest group. I've occasionally lent my *fist* to my area VHF club to help them run up their CW totals.

Even though you are not knowledgeable about the equipment and the bands, operating is operating. Shouting CQ TEST into a microphone is the same essential practice on any band in hamdom. By helping out you will be sure to get to know a couple of folks who will help *Elmer* you into the microwave world. I find microwave operators to be a fairly gregarious bunch that like to share their ideas with one another. After all, it takes two to communicate in this hobby.

UNCLE SKIP'S CONTEST CORNER

10-10 International Winter Contest (Phone)

Feb 7 0001UTC - Feb 8 2400UTC

Minnesota QSO Party

Feb 7 1400UTC- 2359UTC

Delaware QSO Party

Feb 7 1700UTC - Feb 8 0500UTC & Feb 8 1300UTC - Feb 9 0100UTC

North American Sprint (Phone)

Feb 8 0000UTC - 0400UTC

YL-OM Contest (CW)

Feb 14 1400UTC - Feb 16 0200UTC

FISTS Winter Sprint

Feb 14 1700UTC - 2100UTC

North American Sprint (CW)

Feb 15 0000UTC - 0400UTC

QRP ARCI Winter Fireside Sprint (SSB)

Feb 15 2000UTC - 2400UTC

ARRL School Club Roundup

Feb 16 1300UTC - Feb 21 0100UTC

ARRL International DX Contest (CW)

Feb 21 0000UTC - Feb 22 2400UTC

YL-OM Contest (SSB)

Feb 21 1400UTC - Feb 22 0200UTC

CQ 160-Meter Contest (SSB)

2 Feb 28 200UTC - Feb 29 1600UTC

FYBO Winter QRP Field Day

Feb 28 1400UTC - Feb 28 0200UTC

North Carolina QSO Party

Feb 29 1700UTC - Mar 1 0300UTC

Maybe the most exciting thing of all about microwave communication is that there are still new worlds to conquer. Distance records are constantly being challenged as hams strive to understand better ways to operate. Since so much of the equipment is experimental and home made, innovation is commonplace. You could find yourself actually advancing our understanding of how radio works. Most importantly, you will be finding new ways to have fun in the greatest hobby in the world.

I'll see you on the bottom end of 40 meters, or maybe one of these days you might catch me up at 300 GHz. Stranger things have happened!

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Useful Antenna Concepts

◆ An Antenna Which Exists Only in Theory:

The “isotropic antenna,” an antenna which exists only in theory, has been found useful in investigating and discussing antenna theory. This antenna is considered to be a point source of electromagnetic radiation and reception (radio signals, TV signals, etc.). It is completely non-directional in that it is said to transmit and receive equally well in all horizontal (compass) directions, and all vertical (both up and down) directions.

The responsiveness of an antenna in various directions is known as its “radiation and reception (R&R) pattern.” The amount of this responsiveness, for both transmitting and receiving, is described in terms of the antenna’s “gain,” (responsiveness). The R&R pattern of an isotropic antenna would be a sphere, indicating that it had equal gain in every direction from the antenna.

The non-directional R&R pattern of the isotropic antenna serves as a basis of comparison in describing the patterns and gain levels of real-world antennas. Of course real-world antennas are the ones we can touch with our hands, hook up to our radios, and use to support radio communications. R&R patterns of real world antennas show the antenna’s gain in all horizontal directions, or at all vertical angles. This gain is measured in “dBi,” which stands for “decibels of gain compared to an isotropic antenna.”

In texts on antenna theory, the R&R patterns of the antennas discussed are often described as if the antenna were in empty space, far from any real-world environmental factors. When we study antennas described in this theoretical way we sometimes forget that their patterns, when they are in the real world, are usually very different from that which they would have in empty space. Objects such as metal buildings, fences, etc., if near the antenna, can change the antennas R&R pattern.

However, the proximity of the antenna to earth is usually the most influential factor causing this change (compare figs. 1A, 1B and 1C).

◆ Some Real-World Antenna Characteristics

Resonant and Non-Resonant Antennas :

Antenna elements possess inductance and capacitance which combine to make the element a tuned circuit. Antennas which are intentionally tuned to a particular frequency are said to be “resonant” at that frequency. These antennas are in fact tuned to perform maximally on that frequency. Actually an antenna responds to a band of frequencies centered around the frequency at which it is resonant. Some antennas are made broadly responsive such that they are tuned to a broader band of frequencies rather than peaking sharply at one single frequency. Antennas can be made broad banded by various means including the use of larger-diameter elements, and the use of multiple elements of varying resonant lengths.

Most of our familiar antenna designs are resonant: examples include the half-wave dipole; quarter-wave, grounded vertical; the quarter-wave ground plane; the Yagi-Uda beam; the cubical quad beam; the resonant long-wire beam, the resonant rhombic, and the resonant V.

Non-resonant antennas are not tuned to a particular frequency, and tend to perform well over a wide portion of radio-frequency spectrum. The common means of making an

antenna non-resonant is to provide a resistance connected between the antenna and the ground. This resistance dissipates non-radiated RF energy traveling on the antenna as that energy reaches the end of the antenna. Examples of non-resonant antennas which function in this fashion include the non-resonant (terminated) rhombic, and the non-resonant (terminated) V.

Frequency-independent antennas are an interesting variant of resonant antennas because, even though they are resonant, they have bandwidths comparably to those of non-resonant antennas. Their remarkable bandwidths are attained by special techniques such as having multiple elements progressively resonant over a range of frequencies, or special tapered spiral construction. Examples of frequency-independent antennas include the popular log-periodic dipole array (LPDA), and the conical, equi-angular spiral antenna.

◆ Single-Band, Multi-band, and All-Band Antennas:

Simple wire antennas, such as the halfwave dipole, are single-band antennas; however, they can be modified to function on more than one band. Tuned circuits called “traps” can be used to respond at specific frequencies to electrically isolate portions of an antenna’s elements, and produce resonance

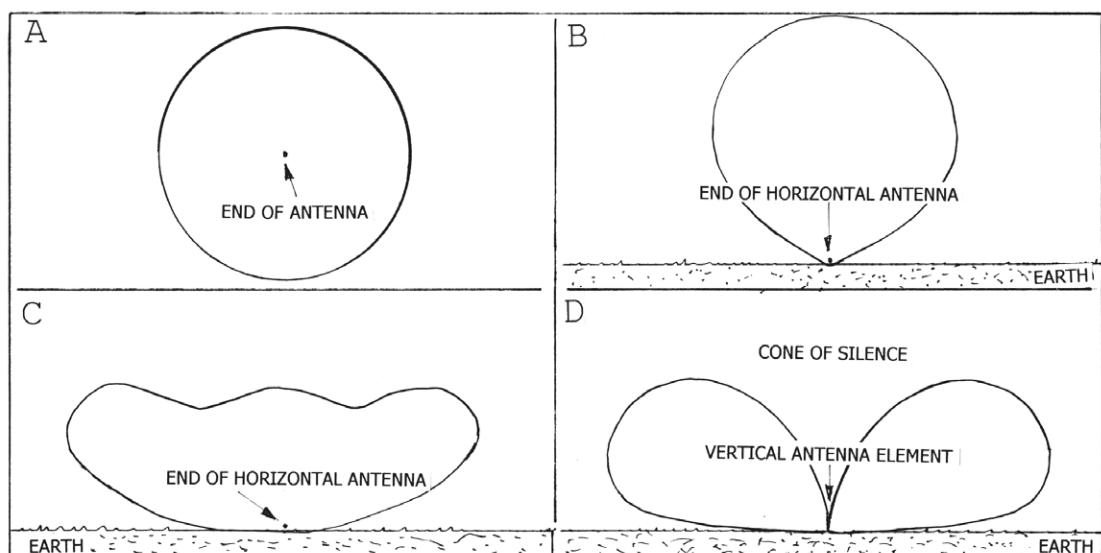


Fig 1. Approximate vertical patterns for a half wave dipole in free space (A), the same dipole antenna as in A, but now sited on earth 1/4 wavelength above the earth. (B), the same dipole as in A and B, but now sited 1/2 wavelength above the earth. (C), The vertical pattern of a quarter-wave ground plane antenna. (D).

This Month's Interesting Antenna-Related Web site:

The Marine Corps kindly makes its 192-page *Field Antenna Handbook* available for free here:

<http://www.armymars.net/ArmyMARS/Antennas/Resources/usmc-antenna-hb.pdf>

different from that of the entire length of the element. Another technique is the use of multiple elements, each element resonant on a different band.

We sometimes encounter the term "all-band" antenna. Of course no antenna can cover all possible bands with really good results. In the past this term was sometimes used to describe a trap antenna which covered all the amateur-radio portions of the HF band. Some operators use an antenna, such as a long wire, in conjunction with a matching circuit (antenna tuner). By use of the tuner the resulting antenna system can cover such a wide range of frequencies that the combined antenna and tuner are sometimes referred to as an "all band" antenna system.

◆ Non-Directional, Omni-Directional, and Directional Antennas:

The isotropic antenna mentioned above is the only really non-directional antenna. All real-world antennas have some difference, however slight, in their responsiveness in different directions. Some antennas, such as the grounded quarter wave vertical, and the vertical ground plane antennas, do give an essentially non-directional R&R pattern in the horizontal plane, responding in all compass directions equally. Such patterns are called "omni-directional."

Antennas with omni-directional patterns have very low responsiveness directly overhead producing a "cone of silence" (fig. 1D) directly above the antenna. This feature is useful to pilots flying to an airport by following signals from such an antenna. When the signal fades quickly out they know they are directly over the antenna.

There are many designs for "beam" antennas whose R&R patterns concentrate their responsiveness in particular directions. When properly oriented, a beam antenna transmits a stronger signal in a desired direction and reduces interference in directions where no communication is desired. Similarly, during receiving, beams concentrate their responsiveness in the desired direction while reducing responsiveness in other directions. This favors the desired signal, and reduces interference from signals arriving from the non-desired directions.

◆ Antennas for HF DX vs Close-in Communications

The vertical R&R pattern of an HF or lower frequency antenna is your best indicator of the distances at which it is likely to support DX communications well. Those with lower-angle patterns usually perform

better for DX, and those with higher-angle patterns are better for close-in work. For this reason vertical antennas are generally considered good HF DX antennas.

However, for most antennas – particularly linear, horizontal antennas, their vertical R&R patterns are heavily influenced by the height of the antenna above the earth (compare figs 1B and 1D). Horizontal antennas described by their manufacturers as "good DX antennas" will likely be poor for DX work unless mounted above earth at least a half wavelength as measured at their operating frequency. Mounted a quarter wavelength above earth the antenna will support closer-in communications well.

◆ Higher Gain and Lower Gain Antennas

Above 10 to 30 MHz or so, received noise is usually low enough that higher gain gives higher quality of reception. However, below these frequencies we generally find that high gain is not particularly important. More important is whether you want all-around, omni-directional responsiveness, or want communication in one specific direction. And do you want communication with nearby stations, or is DX your goal?

The horizontal and vertical directivity of an antenna are usually more important than its gain. In fact some antennas, like the Beverage and table-top loops, are very useful because of their highly directive patterns even though they are low-gain antennas. The quarter-wave ground plane antenna has relatively low gain, yet is extremely useful in many applications because of its omni-directional pattern.

◆ And So

The concepts covered above are the main ones needed to select an antenna for your application. There are various other antenna concepts that are also of interest, and we will cover them at some future date.

RADIO RIDDLES

Last Month:

I asked: "Physical length" is length you can measure with a ruler or tape measure. The equations given for this month's antenna elements give the physical length you must make the antenna's elements. But what are the "electrical lengths" of the elements? Are they the same as the physical lengths? Or are the two kinds of lengths different, but somehow related to one another? Or is there even such a thing as electrical length?

Well, yes, there is such a thing as electrical length. We discussed resonant antennas above. The common means of making a linear antenna element resonant is to make its electrical length equal a half wavelength at its fre-

quency of operation. The physical length of the half wavelength dipole is around 117 feet on 4 MHz, or 16 feet on 29 MHz. Other frequencies would yield other physical lengths for their electrical half wavelength. But the element's electrical lengths would be a half wavelength in each case. So, as you can see, electrical length is a useful measurement, and is measured in wavelengths.

This Month:

What is over a mile tall, travels faster than a speeding bullet while keeping its feet in the ground, and yet progressively leans forward so much that it eventually topples onto the earth? Hint: It's not a tired, giant Super-radio-man.

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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The "Human" Side of Radio Restoration

Now that we've completed the unexpectedly difficult Hallicrafters S-40A restoration job, let's take on a much simpler receiver for a change of pace. Our new project, a little RCA Victor Model 1AX1 a.c.-d.c. radio, is what we call an "All-American Five" set. In other words it uses the standard octal-base tube complement found plugged into thousands of small table model radios of the 30s and 40s: 12SA7 oscillator-mixer, 12SK7 i.f. amplifier, 12SQ7 detector-first audio, 50L6 audio output and 35Z5 rectifier.

We worked with a Philco "Transitone" a.c.-d.c. set as our first restoration project (beginning in the November 2000 issue of *MT*). But although the circuitry was similar, this is our first encounter with the actual "All-American Five" series of tubes. The Philco used Loktal-based equivalents.

Why would I want to regress to a set that is both of a fairly simple type and not all that different from one that we've already discussed? Well, for one thing I love doing restorations of "junkers" – which this one is – and for another, the issues to be dealt with are a little different from the purely electrical ones we worked with on the Philco. There are physical/mechanical problems that haven't come up in any of our restorations up to now, and there are also some interesting issues that I'll call "human," for want of a better word.

Like the S-40A, this little RCA is a radio

that I remember fondly from my younger years. I never actually owned an S-40A, but the RCA set is the same model I received as a birthday present back in the dim past. It was the first radio that belonged personally and wholly to me and I loved it! The Model 1AX1 first hit the market in 1940, the same year that Hitler started World War II in earnest by simultaneously invading Holland, Belgium and Luxembourg.

So in addition to such programs as *Jack Armstrong, All-American Boy, I love a Mystery, Lights Out, and The Shadow*, I also followed the changing fortunes of the Allies on the battlefields of Europe and the Pacific. But even though I loved the radio, I was also a kid. Little by little through careless handling, the Bakelite cabinet became cracked and chipped and – bit by bit – fell apart. Eventually, my radio was reduced to little more than a bare chassis with a few fragments of the cabinet clinging to the bottom and sides.

By then the set was relegated to my "radio workshop" in the basement, where I continued to enjoy listening to it. But one day I read an article on how to align i.f. transformers by ear. Immediately getting out my screwdriver, I began tweaking the RCA's trimmers with great enthusiasm – and soon the signal disappeared into never-never land, whence it never returned.

◆ Nostalgia and Serendipity

I hadn't thought much about my ill-fated childhood radio as the years passed but one day, five or six years ago, I saw a chassis of that model under someone's table at a radio meet. It was filthy and stripped of tubes. Also, the line cord was cut off – a sure sign that the radio had NOT been retired in working condition. But once I spotted it I had to have it, and I don't



I found the little RCA 1AX1 chassis sitting under a flea market table in sadly neglected condition. But it was the same model I'd owned as a kid and it was all there except for the cabinet. So out came my wallet.



Years after I had purchased the 1AX1 chassis, a proper cabinet turned up at another flea market. It was an exciting find!

suppose it cost me more than a buck or two.

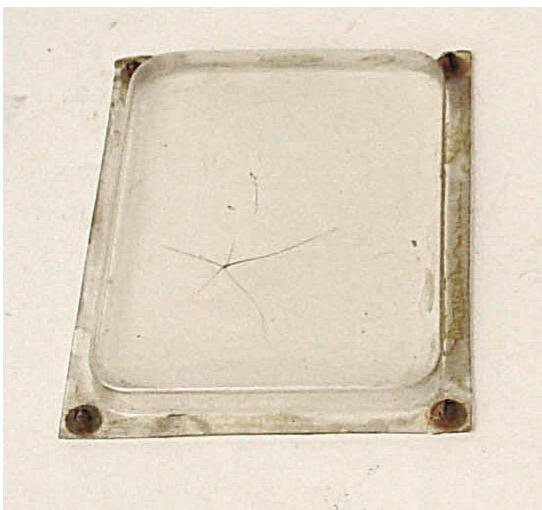
Examining it at home, I realized that – sad looking though it was – all of the parts were there and the radio had not been messed with electrically. I put it aside thinking that I would undertake a restoration if I ever found the proper cabinet for it. And that's just what happened at last year's Antique Radio Club of Illinois big late-summer meet! I was sitting at a seller's table that I was sharing with a friend when I happened to look up at a table across the way. Out in plain sight was not just one, but a pair of the unmistakably correct cabinets!

Prior to seeing those cabinets, I wouldn't have been able to draw you a picture of the one I was looking for – but once I spotted them I knew they were correct. I went over and looked, and sure enough the cabinets were RCA models. I immediately produced the required five bucks and made one of them my own. Later, at home, I was gratified to find that my acquisition fit the radio perfectly – and another restoration project was born!

It's probably no news to you many of us are drawn to these old sets because they can be doorways through which we can go to revisit the past. A little more subtle form of attraction is the opportunity to exercise serendipity – or the art of acquiring needed items, sometimes in unlikely places, by being sharp-eyed and alert. It's really a trip when a part needed to complete a restoration turns up suddenly after a long dry spell!

◆ Now for the Detective Work

Studying the tube layout pasted to the bot-



The cracked and discolored dial window was removed from the cabinet, taking great care not to lose the tiny "press-in" fasteners.

tom of the cabinet, I could see immediately that, even though it was the correct style and fit for my radio, this cabinet had originally housed a different model. That model used the "All-American" five series of tubes, but also had a ballast tube (or plug-in resistor). My set (as well as the one I remembered) had sockets only for the five tubes. An i.f. transformer was mounted in the spot where the ballast socket would have been. And there was an unused chassis cutout next to the speaker that would have accommodated the transformer had the space it now occupied been needed for the extra tube socket. In fact, the transformer was shown in that position on the chart that came with my cabinet.

Looking up the model number (46X1) shown on the tube layout chart, I studied the Rider's schematic with interest. I couldn't imagine why ballast (normally needed to make up a voltage drop deficit in a series tube heater string that is connected directly across the line) would be needed with an "All American Five" tube set. The voltages of the heaters in this set add up to 121, a good match for standard line voltage.

It turned out that the ballast had been installed only to provide voltage drop to run the pilot light! Normally voltage for the light is taken from a tap on the 35Z5 filament provided for that purpose. But on this radio the tap was left hanging, unused! I sure can't understand why a fairly expensive part like a ballast would have been installed when it wasn't needed!

But if my radio wasn't a 46X1, just what model was it? As it happens, I've just received review copies of the latest additions to Mark Stein's 4-volume set *The Complete Price Guide to Antique Radios: Table Top Radios*. This valuable series contains thumbnail-sized photos and estimates of value for thousands of table models made, roughly, during the period 1930 through 1960. A formal review of the four Stein books will appear in an upcoming "Radio Restorations" column. But if you'd like to know more about them now, I'd suggest a visit to Mark's web site at <http://www.radiomania.com>.

I immediately began to thumb through the RCA sections and soon came upon another RCA model in the identical Brown Bakelite cabinet. It

was identified as the Model 1AX1. An ivory-cabinet version was known as the Model 1AX2. The service data for the 1AX1 (or 2) was in the same Rider's volume (XII) as that for the 46X1 — which was handy. Looking at the schematic, I saw that it matched my radio. There was no ballast; the pilot light operated off the 35Z5 heater tap in normal fashion. Bingo!

And that brings me to another facet of the "human" satisfactions offered by radio collecting and restoration — the fun of doing detective work. Tracing the lineage of an unidentified set can not only be engrossing in its own right, but also deepen one's knowledge of the process of evolution and change in radio design. Someday I hope to find out why RCA engineers decided to wire in that unnecessary pilot light ballast!

◆ **On to the Workbench!**

It took only a few minutes to assess the physical problems of the little RCA radio chassis. The most obvious were the overall coating of gummy dirt and the missing tubes and pilot light. Also, and this is perhaps a small point, the cardboard backing supporting the loop antenna was warped so that it no longer stood up straight. Then I noted that the speaker cone was torn and the paper also seemed very fragile — quite dried out, I suppose.

Examining the speaker a little more closely, I tried gently pushing in on the voice coil at the apex of the cone. It seemed to be rubbing a little, bringing up the possibility that it might have to be recentered. Ordinarily, I would simply remove such a problem speaker and replace it with one of the same size. But this speaker was a "dynamic" one — the first we have run into so far. Such speakers have an electromagnet wired into the radio's power supply circuit instead of a permanent magnet.

An exact replacement for a dynamic speaker is difficult or impossible to find. In the first place, the use of such speakers in small table radios was quite limited; it went on for just a few years before the less expensive permanent magnet ("PM") units were developed. So there aren't that many loose ones around.

Not only that, the field coil of a dynamic speaker doubled as a choke coil for the power supply. The field coil of a replacement speaker would have to have exactly the same d.c. resistance as the original or the radio's plate and screen voltages would be incorrect. Unfortunately there was little standardization of this value, so even if one was lucky enough to find a replacement dynamic speaker of the right physical size, it probably would not have the correct field coil resistance.

Dynamic speakers can be replaced by PM speakers if the lacking field coil is replaced in the power supply circuit by a power resistor of the correct resistance value. But I didn't like the idea of thereby bastardizing the radio and losing what is really a fairly rare feature. I decided to do my best to save the original unit.

My newly-acquired cabinet also had a few

problems. Thankfully, there were no cracks or chips, but the surface of the Bakelite was dull and scuffed here and there. Also, the plastic dial window was yellowed and broken. Of course my empty cabinet had no back cover — which is an essential feature, considering the shock hazards presented by the bare chassis of an a.c.-d.c. radio. But even complete radios of this type are often found without their covers, which were made of a cardboard material that broke easily and usually didn't outlast the first couple of tube changes.

Checking the Internet for a source of replacement dial windows, I found that Bill Turner of 1117 Pike St., St. Charles, Mo. 63301 (636-949-2210; dialcover@wbtv.net) would make and supply one for \$14.00 postpaid. He works from a tracing of the dial window opening. I sent one along with a check and received the replacement with lightning speed, almost by return mail.

I also did some reading about the refurbishing of Bakelite cabinets. Bakelite is really funny stuff. It seems to be very hard and tough, and up to a point this is true. In fact, the material is so dense that it is almost impossible to repair cracks by gluing them. Yet the beautiful polished surface one sees on mint sets is really somewhat fragile.

Next time we'll talk about how this surface was created in manufacture and why one must be careful cleaning it. In the meantime, if you are considering cleaning a Bakelite cabinet, don't even think of using anything stronger than a mild solution of dishwashing detergent (the kind used in sinks, not machines)!

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Uniden BCT8 Scanner

The Uniden BCT8 is a trunk tracking scanner with features primarily useful to drivers. It is the successor to the BCT7, enhanced with trunk tracking capabilities, a full numeric keypad, BCT8-to-BCT8 cloning, and the ability to be controlled or configured by a computer.

The BCT8 provides 250 user programmable channels. Like some of the other Uniden models, there is a service search capability.

What sets the BCT8 apart from other models is that the BCT8 comes preprogrammed with frequencies specific to each state (Hawaii excepted) and an alert feature which emits a beep and flashes a red lamp when activity is detected on a police mobile extender frequency. The latter is a clue that a police vehicle is nearby.

◆ What You Get

Though the BCT8 is chiefly a mobile scanner, it comes equipped for tabletop usage, too. A 117 VAC wall wart power supply comes standard and two mobile DC cords.

One mobile cord plugs in the cigarette lighter and the other has bare wire leads which can be connected to a 12 VDC power source. Oddly, a mobile mounting bracket is not included. As the owner's manual indicates, an MB-007 mobile bracket is available and must be ordered separately.

The BCT8 employs a BNC antenna connector on the rear panel and the radio is furnished with a telescoping antenna as well as a suction cup wire antenna for use inside a window or windshield.

◆ Frequency Coverage

BCT8 frequency coverage includes Citizens Band, the 10 and 6 meter ham bands, commercial aircraft, and the more common land mobile bands. UHF military air, television, FM broadcast, and the 72 MHz bands are not included.

The radio coerces VHF-high frequencies to the nearest 5 kHz step, which doesn't account for federal government assignments. For instance, the BCT8 rounds off the 165.2375 MHz US Customs frequency to 165.2400 MHz.

◆ Memory and Modes

For scanning conventional systems, the BCT8 provides 250 user programmable channels in 5 banks of 50 channels each. The numeric keypad makes frequency entry much easier than on Uniden's other highway scanners. A per-channel rescan delay is available. One channel per bank may be designated as a priority channel.

The BCT8 supports a variety of trunked systems:

Motorola Type II 800 MHz, VHF-high band, and UHF

Motorola Type I and hybrid
EDACS wide band 9600 baud
EDACS SCAT
LTR

Only one trunked system may be programmed per bank, so the radio accommodates up to five trunked systems at a time. Each bank supports five talk group ID lists of 10 IDs each, for a total of 50 talk groups per system.

◆ Scanning and Searching

Memory scanning works in the BCT8 like it does in most other models. You can scan through five private banks of memories and lock out both banks and individual channels so they are skipped.

In addition, you can enable the preprogrammed highway frequency bank during the scan operation, permitting you to scan

a mixture of both highway and personally programmed frequencies.

More general purpose scanners provide a limit search which permits the user to program a lower and upper frequency limit and search between them. While the BCT8 does not support a general purpose limit search, it does provide a restricted band search. The band search employs a fixed step size and mode and fixed frequency limits to search any one of these bands: 25 - 28, 28 - 30, 30 - 50, 50 - 54, 108 - 137, 144 - 148, 148 - 174, 400 - 420, 450 - 470, 470 - 512, and 806 - 956 MHz (excluding the cellular phone bands).

Service Search hunts through banks of preprogrammed frequencies. You may choose from these service banks: local police and county sheriff, fire and emergency medical service, news media, weather, citizens band, civilian air band (excluding the 108 - 117.9875 MHz navigation frequencies), railroad, marine band, and government transportation.

Perhaps future models might include FRS and MURS service search banks, but the BCT8 does not.

The BCT8 displays both channel designations and frequencies when receiving a signal during citizens band, railroad, and marine band service search.

A Hold/Resume button permits pausing on a frequency or talk group during searches and while memory scanning. The Data Skip feature tries to recognize nonvoice signals and ignore them after a brief delay while scanning or searching.

◆ Owner's Manual

The BCT8 owner's manual provides enough information to operate the scanner. Two separate frequency booklets are included with the scanner, but there is no accounting of exactly which frequencies are preprogrammed into the BCT8.

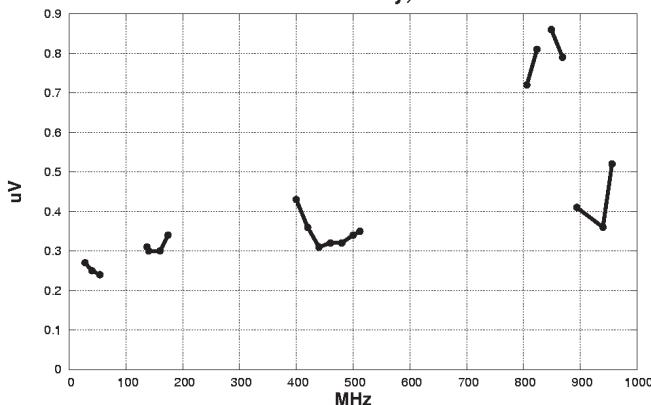
The specifications section is minimal and fails to provide the intermediate frequencies, sensitivity, and other performance figures.

◆ Performance

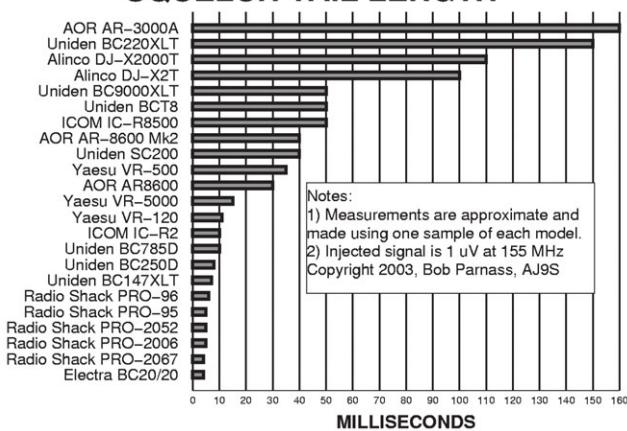
The audio from our borrowed BCT8 (serial number 318Z34000015) is crisp and clear. We measure about 1.6 watts



Uniden BCT8
NFM 12 dB SINAD Sensitivity, s/n 318Z34000015



SQUELCH TAIL LENGTH



MEASUREMENTS

Uniden BCT8 Scanner
S/N 318Z34000015
List price \$319.95
Uniden America Corp.
4700 Amon Carter Blvd.
Fort Worth, TX 76155
tel. (800) 554-3988
<http://www.uniden.com>

Frequency coverage (MHz):

25 - 54
108 - 174
400 - 512
806 - 823.9875
849.0125 - 868.9875
894.0125 - 956

Step sizes (kHz):
fixed, not user selectable

Modes:

AM, NFM, not user selectable
NFM modulation acceptance: 13 kHz

Audio output: 1.6 watts into
8 ohms @ 10% distortion

Attenuator: none

Image Rejection Due to 1st IF (380.7 MHz):

46 dB @ 40 MHz
41 dB @ 155 MHz
45 dB @ 460 MHz
45 dB @ 860 MHz

Squelch tail near threshold
(1 uV @ 155 MHz): 50 ms.

at 10% distortion into an 8 ohm resistive load connected to the external speaker jack.

There is a 50 millisecond squelch tail (noise burst) the squelch control is set at its threshold. We prefer a shorter tail. The burst becomes shorter as the squelch control is tightened, though our BCT8 requires a correspondingly stronger signal to open the tighter squelch.

The BCT8 uses triple up conversion circuitry and has over 40 dB of image rejection – adequate for mobile use.

Interference from a 162.4 MHz NWR transmission can be heard on various VHF-high band frequencies, which is true for most of the other Uniden scanners we review.

◆ Software

The BCT8 is furnished with limited version programming software on a single CDROM. The software requires Microsoft Windows and we didn't try it. Uniden says the supplied

software will run only in "Demo mode," restricting access to only the first memory bank unless you register the software with Uniden.

You can enable more features in the software by ordering a software key from the Uniden web site. Uniden will provide you the information required to activate the additional functionality.

◆ Other Observations

Unlike the Radio Shack PRO-2067 mobile scanner (Sept. 2000 *MT*), the BCT8's keypad is well lit. This is vital for use in a dark car.

The ribbed volume and squelch knobs are easy to grip, though they feel a little loose.

We prefer the BCT8's metal clamshell cabinet to the plastic cabinet on some earlier mobile scanners, like the Relm MS200.

◆ Overall

The BCT8 is targeted for mobile scanning. Therefore, a mobile mounting bracket should be included with the radio instead of an extra cost option.

We were impressed with the BCT8. It doesn't have text labels, CTCSS and DCS squelch like the upscale models. But, the BCT8 is a good radio for mobile use and its preprogrammed frequencies make it a good choice for a newcomer.

The Uniden BCT8 is available from Grove Enterprises for \$189.95. Call 800-438-8155 or visit <http://www.grove-ent.com>

Outer Limits continued from page 69

reminding us that Christmas, New Years, and other holidays are good times to check for pirates. (Uses oldturkeyradio@yahoo.com e-mail)

Radio Free Speech- Bill O. Rights has been back on the air with his advocacy for individual freedoms, of course including the right to operate pirate transmitters. (Blue Ridge Summit)

Ragnar Radio- Last month we mentioned that this one sometimes features country music. But, no sooner was the ink dry on last month's *MT*, that they switched to rock music formats for the rest of 2003. (Uses rangarradio@yahoo.com e-mail)

Undercover Radio- Dr. Benway, "broadcasting from the middle of nowhere," has been adding more of a rock music emphasis to his shows lately. (Merlin and undercoverradio@mail.com e-mail)

Voodoo Radio- Although this one is not a new pirate, its rock music is back on the pirate bands despite its very sporadic schedule. (Elkhorn)

Voice of Captain Ron Shortwave- Captain Ron

normally features rock music, with comedy sketches from time to time. (Uses Captainron6955@hotmail.com e-mail)

WHYP- This memorial station for James Brownyard's licensed North East, PA, operation memorial station continues its programming mix of rock music, comedy sketches, and pirate radio commentary. (Providence)

WMPR- This now veteran pirate remains active with a "dance party" format of techno rock music. (None)

◆ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA maildrops or \$2 US to foreign locations. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 28413, Providence, RI 02908; PO Box 69, Elkhorn, NE 68022; PO Box 109, Blue Ridge Summit, PA 17214; and Box 159, Santiago 14, Chile. Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletins for sending pirate loggings remain *The ACE* (\$2 US for sample copies via the Belfast address above) and the e-mailed Free Radio Weekly newsletter, still free to contributors via niel@ican.net. The Free Radio Network web site, another outstanding source of content about pirate radio, is found at <http://www.frn.net>.

◆ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Dave Balint, Wooster, OH; Kirk Baxter, North Canton, OH; Artie Bigley, Columbus, OH; Cachito, Santiago, Chile; Ross Comeau, Andover, MA; Rich D'Angelo, Wyomissing, PA; Brian Duddy, Nyack, NY; Virginia Enzor, Cary, NC; Harold Frogde, Midland, MI; William Hassig, Mount Prospect, IL; Harry Helms, Las Vegas, NV; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; Bill McClintock, Wellington, OH; Mark Morgan, Cincinnati, OH; Adrian Peterson, Indianapolis, IN; Mike Prindle, New Suffolk, NY; Lee Reynolds, Lempster, NH; Fred Roberts, Hamburg, Germany; Robert Ross, London, Ontario; Martin Schoech, Merseburg, Germany; John Sedlacek, Omaha, NE; Ronnie Stroup, Wooster, OH; Niel Wolfish, Toronto, Ontario; and Joe Wood, Gray, TN.

Hands-On DRM Monitoring - Part 4

Wrap Up and Summary

The past few months we have looked at the new emerging digital radio modulation method, DRM, Digital Radio Mondiale. To be fair, we must keep in mind that as a new technology, DRM is a work in progress. This is the case with all new technologies. To jog your memory just think back to how poorly behaved Windows 3.1 was as compared to Windows 98 SE. Enough said.

Let's do a quick summary of the DRM topics we have covered in this series of articles.

Who is DRM? The group of companies, which comprise the DRM consortium include: Atmel ES2, British Broadcasting Corporation, Deutsche Welle, Hitachi Kokusai, Harris Broadcast, JVC Victor Company of Japan, Merlin Communications International Ltd, Nippon Hoso Kyokai (NHK), Radio(s) Canada, France, Netherlands, Sweden, Vatican, Sangean America, Sony, Telefunken and Thales. This list is by no means complete. Check their website at <http://www.drm.org> for more information concerning members.

DRM Data Structure: We have taken a broad look at the data structure of a DRM signal and its generation. The DRM Standard paper files with ETSI (the European Telecommunications Standards Institute <http://www.etsi.org>) provides a detailed description of the DRM signal including the data structure.

A DRM signal consists of three channels: the Main Service Channel (MSC), the Fast Access Channel (FAC), and the Service Description Channel (SDC). Figure 1 provides an overview of the encoding process as discussed in the *Computers & Radio* columns of November and December 2003. With lots of processes being performed in during DRM signal encoding you can see why it takes a Pentium computer running at 500MHz to do the decoding job!

provides an output suitable for the decoding computer is called the "front-end." This front end radio must be frequency stable, have low internally generated noise and provide a 12 kHz output at a level compatible with computer sound card input. So where can I find a suitable "front end"?

Benefits & Claims: According to the official DRM website, some of the benefits of DRM are:

1. FM-like sound quality with the reach of AM;
2. Improved reception quality;
3. Flexible use of radio, whenever and wherever you want it;
4. No change to existing listening habits: same frequencies, listening conditions (fixed, portable and mobile radio) and listening environment (indoors, in cities, in dense forests);
5. Low cost receiver, low energy consumption;
6. Easy tuning with selection by frequency, station name or program;
7. Wide receiver range with more and better features.

Have we found these benefits to be reality at this time? Read on...

◆ Hardware Requirements

Standalone DRM Radio

Although promised to be introduced in late 2003, a self-contained, no-PC-needed, DRM radio is not yet widely commercially available. Therefore, the DRM consortium benefit of "low cost receiver, low energy consumption" is clearly not a reality at this time, at any cost. The only way to receive DRM at this time is using a radio and a DRM software program running on a PC.

What's a DRM Front End?

What grabs the signal out of the ether and

provides an output suitable for the decoding computer is called the "front-end." This front end radio must be frequency stable, have low internally generated noise and provide a 12 kHz output at a level compatible with computer sound card input. So where can I find a suitable "front end"?

Buy or Modify

The Ten-Tec RX-320 DSP black box PC shortwave receiver has been around since 1998. See <http://www.tentec.com> In my opinion, it was excellent value for money then at around \$320 and in the used radio-market it's an even better value. With a good outdoor antenna its shortwave performance is outstanding for any type shortwave listening: broadcast, utility, digital modes and DRM.

For use as a DRM front end, the original RX-320 must be modified to provide the required 12 kHz intermediate frequency (IF) output. Ten-Tec will modify any RX-320 to give it the required DRM 12 kHz output (RX-320D) for \$47 including return shipping in the continental USA. See their website for more information at <http://www.tentec.com/TT320.htm>

Alternatively, if your receiver meets the initial criteria, as does the RX-320, you can build a small printed circuit board (PCB) that converts your radio's existing 455 kHz intermediate frequency output into the 12 kHz required by the DRM software. A PCB is available from a number of sources. Try looking on <http://home.t-online.de/home/sat-service/sat/DRM/DRM.html>

For do-it-yourselfers (also known as home-brewers) modification details for a number of receivers can be found at http://www.drmrx.org/receiver_mods.html At this site you'll find modification details for ICOM IC756, Kenwood R1000, Grundig Yacht Boy400, JRC NRD 525, Yaesu FRG-100, Yaesu FRG-8800, AKD Target HF3, AOR 7030, Sony ICF-SW77, AR 3030, Sangean ATS-803A, Lowe HF225, Ten Tec RX350 and even a DRM Car Receiver.

For most of us the Ten-Tec RX-320 provides the lowest risk, cost-effective route to DRM reception, while providing good quality general shortwave capabilities.

◆ The DRM Software

The official DRM software requires as a minimum a 500 MHz Pentium computer with 64 MB RAM, 50 MB free hard drive space, with a DRM compatible 16-bit soundcard running Windows 98, 2000 or XP. The software is available from VT Merlin Communications at

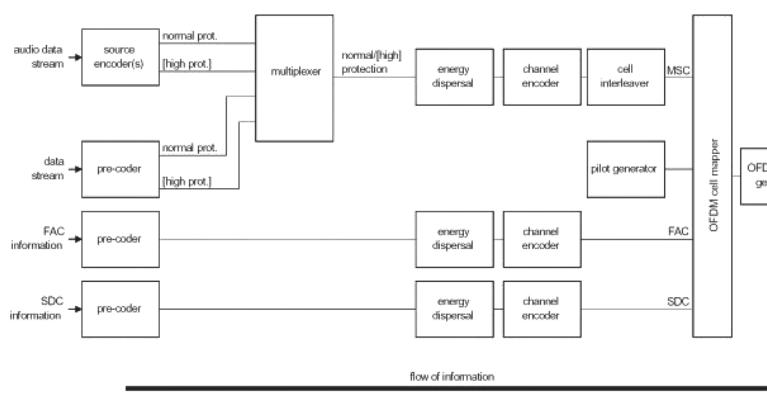
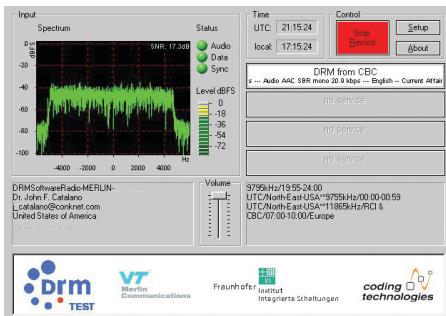


Figure 1: Conceptual DRM transmission block diagram

Block Diagram of DRM Signal Generation



Computer Screen Receiving DRM Canada Broadcasting Corporation's Radio Canada International Current Affairs Program

<http://www.drmrx.org/> for 60 Euros. It is very important that you see their website for details on the soundcard compatibility!

The only connection you need is between the 12 kHz receiver output and the soundcard input of your PC, as in Figure 2 taken from the DRM software manual. If all goes well you will hear beautifully clear audio and see station and programming data scrolling across your screen as shown in Figure 3. Clearly the DRM goals of "FM sound quality audioand ... Easy tuning with selection by frequency, station name or program ..." have been met very successfully and impressively!

The Rest of the Story

Be aware that I had a very difficult time getting to this point of DRM reception! My first computer, a laptop, although having all the required hardware, would not do the job. That turned out to be an incompatible modem ... I think.

Finally, it took my Pentium III 800MHz games computer to do the job that you see in Figure 3. You may be luckier, but if anyone tells you receiving DRM is like "falling off a log" they may also have a bridge to sell you!

Why Me?

Was the problem just due to my hardware, location or antenna? In an attempt to answer this question we enlisted the help of a number of DRM-capable listening stations to determine how "finicky" the DRM signal is to propagation/listening location. I had three DRM listening stations spread from the New England to the Mid-Atlantic to the South. All were monitoring RCI transmitting from Sackville on Canada's East Coast at the same time. All stations were registering strong signal strengths of RCI. The New England station (me) could not "lock-in" on the DRM signal. The Mid-Atlan-

tic station was receiving solid DRM. And the Southern monitor also had no "lock-in." A fourth station, less than 5 miles from the Mid-Atlantic station (the only station that was receiving DRM audio and data) could not get continuous DRM copy.

However, the next night resulted in excellent DRM audio and data at my location. Nothing had changed at my listening site ...that I know of.

What's Going On?

My experience has left me with many questions concerning DRM monitoring. They fall into three categories that may be related: propagation, electrical noise and the computer system. To summarize:

Propagation: The distance to the transmitter did not appear to be directly related to the results. A few miles of local distance between listening stations seemed to affect the results dramatically.

RF/Electrical Noise: There can exist many different interfering noise sources that would have a major effect on receiving DRM. These sources can be local AM (MW) radio stations, power line utility broadcasts and home light dimmers to name a few. Usage and severity will vary greatly from hour to hour.

Your Computer System is rich in harmonics, of the CPU clock, RAM/ data bus frequencies, CRT/LCD scans and high-powered switched mode power supply hash. When these mix together the result is wide band noise almost from DC to light. Trying to decode DRM's complex data stream is a challenge in an electrically "quiet" environment. Imagine the problems of a noisy PC environment! This noise will vary greatly from PC to PC.

Goal ...or Foul?

DRM's stated benefit goals include "...Same listening environment (indoors, in cities, in dense forests) and ...AM reach." I think the above multiple site monitoring results and other considerations show that these goals are desires of the DRM consortium, at best.

Looking back, we have covered lots of DRM ground! But some of your DRM questions still need to be covered.

Freeware? Yes, But ...

One of the most popular questions I have received is, "Is a freeware version of DRM software available?" As one who is always looking for value, I did some real hard Internet searching for free DRM software. Well, I found only one

free DRM program. The people at The University of Darmstadt in Germany have worked since 2001 to produce a DRM program called DREAM.

Now before you get all excited let me say that DREAM's goal is not to replace the fully functional commercial program. Instead its avowed intended purpose is just to enable people to become familiar with DRM monitoring and its digital structure and capabilities.

DREAM version 0.9.3 can be run under Windows or Linux operating systems. We'll just take a quick look at trying to use the Windows version. If you are an experienced Visual C++ 6.0 programmer you should have little problems. However, for the rest of us who do not use Visual C++ everyday, you may think twice.

Dream or Nightmare

To start with you will need Windows, Microsoft Visual C++ 6.0 with the Service Pack 5 and Trolltech QT 2.X. You will need to download the DREAM DRM software. Then you'll have to download and create the following libraries: FFTW, QWT and FAAD2. Finally you will have to use some C++ skills in putting together the results into an executable program. After spending a considerable amount of time downloading and creating I must confess that I gave up.

In my opinion, in its present form DREAM version 0.9.3 is just not worth the time and effort for most of us interested in monitoring DRM. However, if you would like to give it a try you can find all the DREAM details at: <http://www.tu-darmstadt.de/fb/et/uet/fguet/mitarbeiter/vf/DRM/installation.html>

Digital Radio Today

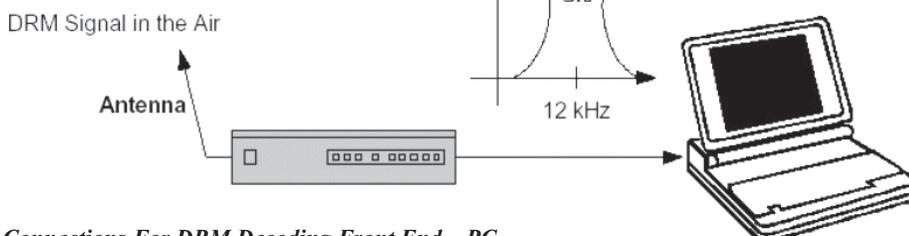
DRM is not the first technology to attempt to reliably broadcast and receive digitized audio and data over shortwave. As long ago as 1993 I was involved with major efforts in digital shortwave technology. None have survived commercially for many of the reasons that we have spoken about this month.

But technology has taken huge leaps in the past few years. What was impossible then is now almost commonplace. DRM may be a prime example with its crystal clear digital audio.

However, one thing may not have changed. As we saw with Windows 3.1, AM stereo and many, many other examples, sometimes overzealous manufacturers try to make an evolving technology a standard before its time. We'll have to watch the development of the very promising DRM technology in fulfilling its declared technical and economic "benefits" during the coming months. Things move fast in the world of technology.

As the Chinese blessing says, "May you live in interesting times." But as the Chinese curse also says, "May you live in interesting times!" The future will tell.

Let me take this time to extend belated January New Years wishes to some of you, on time February New Years wishes to others and months early New Years wishes to still others around the world. Happy and peaceful New Year to all.



Connections For DRM Decoding Front End - PC

MT



REVIEW

MFJ Travel Tuner

By Bob Grove

The actual function of an “antenna tuner” seems to remain shrouded in mystery for most hobbyists. Most amateur radio operators seem to think it’s mandatory for every HF transceiver, and many shortwave listeners are certain that it’s the magical answer to improved reception. There is both myth and misunderstanding, but no magic.

These simple inductance/capacitance adjusters are more correctly called “transmission line impedance matching devices” (shortened to “transmatches” by the American Radio Relay League) than “antenna tuners”; they compensate for inductive and capacitance reactance (mismatches) throughout the antenna system – antenna, transmission line and all – not just the antenna.

The main purpose served by the transmatch is to adjustably cancel these reactances to provide an efficient transfer of power from the transmitter to the antenna without the losses caused by impedance mismatches which produce high voltages on the transmission line along the way. These periodic high and low voltage points exhibited by standing waves are measured as a ratio (VSWR, often shortened to SWR).

Theoretically, in a lossless antenna system, the SWR wouldn’t matter, but the practical fact remains that some transmitted power does leak across the insulation in the coax, dissipating as heat, and the higher the voltage, the more power loss.

In addition, transistors are vulnerable to burnout from high voltages, much more so than the old vacuum-tube circuits. This is why modern transceivers invoke automatic power reduction when high SWR is detected.

◆ How About Receivers?

Shortwave receivers aren’t concerned with transmitted power, so do they need transmatches? Generally not. Modern receivers are very sensitive, limited in weak-signal detection only by the accompanying atmospheric noise and co-channel interference. The bigger the antenna, the stronger the signal and interference levels.

In nearly all shortwave receiving applications where an external antenna is attached to the receiver, although a signal-strength meter may show higher readings as the tuner is peaked to frequency, this peak is due to a proportionate increase in

noise right along with signal. There is no improvement in signal *over* the noise.

But there are exceptions. It is possible for low-cost receivers with poor RF selectivity and dynamic range, such as portables, to benefit from a transmatch when used with an externally-connected antenna. This is because such a tuner acts as a frequency-selectable RF stage, reducing off-frequency, strong-signal interference from IF images, intermodulation and desensitization, allowing improved weak-signal reception.

◆ Enter the new MFJ-902 Travel Tuner

MFJ Enterprises is renowned for their low-cost, hobby-radio accessories. Recently they released a transmatch particularly well-suited for compact fixed, portable, backpack and mobile transceivers in the amateur, commercial, experimental, government and military radio services.

With a frequency range of 3.5-30 MHz (80-10 meters) and a power limit of 150 watts, this transmatch works with virtually any high-frequency transceiver on the market. It can be used

with coax-fed or random-wire antennas. Although it doesn’t have a meter for VSWR adjustment, most modern rigs have, making such an indicator often redundant and unnecessary.

Architecturally, the 902 is a tried and proven L/C “Tee” network. It utilizes a tapped inductor wound on a 3-toroid stack and a pair of 322 pF air-variable capacitors with porcelain insulators. Two SO-239 female connectors on the rear panel invite interconnection to standard PL-259 fixtures. A banana pin plug is included for random-wire applications. A slide switch permits the tuner to be bypassed for direct antenna feed from the radio.

◆ Let’s Try it Out

Connecting the 902 to my Yaesu FT-100D transceiver was easy – a short PL259/PL259 jumper from the tuner to the rig, and the antenna cable to the tuner, and I was ready to go.

But I couldn’t detect any difference in tuning, and there was a tell-tale scratching sound coming through the speaker as I rotated a control. Removing the two cabinet screws and lifting the cover, I confirmed my suspicions.

Several plates of a variable capacitor were rubbing together; a wire passing by a soldering lug had been prepared for soldering, but never was; and a tuning knob was slipping on its shaft.

Since no schematic diagram was provided, I had to experiment with and without a shorting clip to be sure the wire was supposed to be soldered to its nearby lug. I know that new products are often prone to initial manufacturing bugs, so I decided to repair the unit myself as a “getting acquainted” experience.

After resetting the bent plates, soldering the ground wire, and filing a flat on the tuning shaft so the set screw could be tightened, I was ready to go.

◆ How Well did it Work?

It worked very well. The accompanying instructions make adjustments easy, and maximizing my rig’s power with the tuner’s controls was simple. An excursion across the HF spectrum showed that the tuner worked effectively on a test antenna from 2-30 MHz; it is not designed to work on 160 meters (1.8-2.0 MHz), and it doesn’t.

One of the most common criticisms of tuners is their internal resistances; after all, you want all the power to reach the



antenna, not wasted heating the components. In both the bypass and operational modes, the 902 adds less than 0.1 ohms to the path, not much since the series impedance of the antenna system is nominally 50 ohms.

Heavy gauge wire on the toroid coil is a good sign, but will it make a noticeable difference to the RF path in terms of efficient power transfer? We decided to construct a simple test instrument consisting of a 100 watt light bulb to be used as a dummy load, and a metered photocell to read its

brightness.

Were there internal resonances that could sap power from the line? Not according to our measurements. The meter registered identical brightness throughout the 2-30 MHz spectrum with the transmitter delivering the same output wattage.

◆ Applications

I'm already envisioning taking this transmatch along with my FT-100D on my

next vacation. It would be an invaluable asset for QRP or full-transceiver output into random-wire motel antennas or even electrically-short mobile and portable whips. Tiny enough to hold in your hand (4-1/2" W x 2-1/4" H x 3" D), it can be stowed in a briefcase or backpack with ease.

MFJ-902, \$69.95 plus shipping from MFJ Enterprises, PO Box 494, Mississippi State, MS 39762; 800-647-1800; <http://www.mfjenterprises.com>

The PowerPort GearHarness

By T.J. "Skip" Arey N2EI

Those of you who have followed my writings in the *On The Ham Bands* column and my previous work with *MT*'s *Beginner's Corner* know that I participate in the radio hobby from DC to Daylight. This is both a blessing and a curse.

I have any number of radios, many of them portable and handheld types, that allow me to listen in on just about anything in the radio frequency spectrum and talk on all the frequencies that I can legally operate on as a ham. However, in doing this, you run up against a unique law of diminishing returns: That being, the more radios you hang on your belt, the more likely your pants are going to fall down! My waistline is good for two medium sized handhelds and then I need to start holding things up with suspenders or something.

When operating in extreme conditions such as search and rescue work, I've even used surplus military Load Bearing Equipment (LBE). You do this for a while and you start to mutter under your breath..."if they can put a man on the moon... why can't they come up with a better way to carry radios."

Well, I am here to tell you that a significantly better way to carry radios and radio gear has come along in the form of:

The PowerPort GearHarness

\$36.95

Cutting Edge Enterprises
130 Anacapa Circle
San Luis Obispo, CA 93405
1-800-206-0115
<http://www.powerportstore.com>

The Powerpoint GearHarness appeared on my Holiday Wish List in the November 2003 issue of *MT*. Since that time I have had the opportunity to take The GearHarness out to every activity short of a parachute jump (I'm working on it) and found it to exceed my every expectation for radio adventure.

This lightweight and durable harness has three pockets. One is in the back and the other two are in the front. There are also two vertical pockets that have multiple uses depending on the activity. Along the bottom, one large zippered pocket runs the entire width of the front of the harness for stowing larger items.

The harness also has multiple connecting points for accessories. The GearHarness has a heavy duty nylon exterior with foam padding and a mesh back for ventilation.

I took mine out of the box and started stuffing radios into it just to see how things might go. It didn't take very long for me to come up with the "hot setup" for my kind of tactical radio operation under extreme conditions.

In the "over the shoulder" pocket I placed my Uniden Bearcat Trunk Tracker handheld that runs constantly with the requisite public service frequencies I monitor during a typical ARES/RACES activity. In some instances I might swap this radio out in favor of an AOR-8000. After all, it's important to keep one ear on what's going on around you.

This radio fed a small speaker that I clipped to one of the three front "snap" tabs. Right below this on the second "snap" tab, I mounted my diminutive Icom R2 that I usually set up for

any special frequency monitoring the activity might require above and beyond what the Bearcat or AOR 8K is keeping track of (e.g. Marine or Railroad frequencies). Having these other signals coming out of a different radio alerts me to their overall importance.

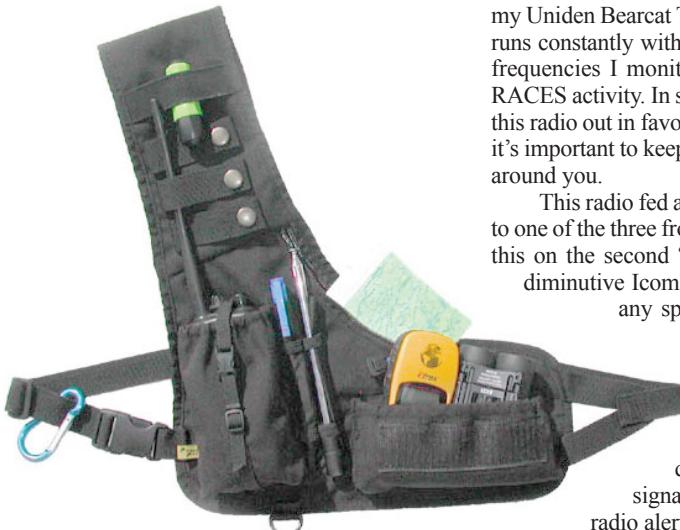
tance better than any priority channel setting.

Finally, in the lower right front pocket I place my main tactical rig, a Yaesu RD-50 feeding either a speaker/mike or headset depending on how free I need to keep my hands. I set the RD-50 up with a longer, non-standard antenna that goes under the lower "snap" tab to keep it out of mischief.

In the left front pocket I loaded a small first aid kit, a few "glow sticks" for evening operations and my Gerber Multi-Tool. The large zippered pocket got filled with tactical maps, emergency service SOPs a few pens and a notepad. I've still got enough room for spare battery packs if the situation warrants it.

With this setup I am able to carry significantly more radio gear that I was ever able to hang off my belt. Further, I am able to carry it in a safe and balanced way that does not restrict my freedom of movement at all. (Perhaps most importantly, I can use the on site sanitary facilities without worrying about one of my radios doing the deep six into a port-a-potty. That simple bit of insurance more than covers the cost of the GearHarness.)

So far I have used the GearHarness on a number of emergency service drills, hiking, bicycling, light climbing, and working on ladders and roofs. The ability to have all of your radio gear at hand and yet safely out of the way cannot be underestimated. The GearHarness is tactical radio done right!



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How's That Thing Really Work, Anyway? Receivers

By Carl Herbert, AA2JZ

At a recently attended club meeting, a newly licensed operator confided in me: Yes, I passed the test, but I haven't any idea how any of this stuff works! I just memorized enough to get through the test and get my license. Sound familiar to any of you out there?

The neophyte radio amateur had spent hours studying the license manual, practicing the exams, to finally complete the process and gain his or her ticket to proudly display on the wall. This is great! One more member enters the hobby.

But there's a problem here! Many (and some longer licensed hams) haven't a clue as to how their gear performs the functions that it does. This article isn't intended to replace the countless tomes available that teach the engineering functions from the ground up. It's merely an overview of the basic sections of a piece of equipment, how they interact with each other to produce the desired result after turning on the switch. Knowledge is gained one segment at a time. I hope this segment encourages you to further your knowledge in electronics. If not, you should at least have a basic understanding of how a receiver works.

I chose to begin with a receiver. No particular reason, it was the first piece of gear that came to mind. When telling you about a circuit or function, I will try to stay away from the engineering facts that all equipment are built from, and attempt to explain the subject without a lot of technical jargon. My goal is to have you be able to visualize the happenings within your equipment sections, not to design the circuits. You can add all this knowledge to your storage bank later as you gain experience in the hobby. For now, just understanding the basic ideas of how a system works is OK.

Block Diagrams

Let's begin with a very basic *block diagram* of a receiver. Block diagrams are great because they represent circuits and paths for signal flow. The actual circuit components, their values, and how they are connected, are described in a *schematic*. We won't deal with schematics here. Block diagrams show direction or the logical path followed to achieve results. They also present an easy to understand overview of the device being described. This process will become evident as we progress.

To help you understand how the receiver works we should have a typical example. Let's suppose that we would like to listen to the 80 Meter band, say from 3.500 MHz to 4.00 MHz. While exploring the lower end of the band, we hear AB2AF, Arthur, sending CW on 3.550 MHz. We know what frequency his transmitter is on because the frequency is marked on the front panel of our receiver or the digital readout indicates that frequency. But how does a signal being generated far above the audio spectrum, become transformed to the range usable by our human hearing?

Block A, is the starting point of a receiver. It is the RF INPUT circuit and is connected to the antenna. It is composed of circuits tuned to the desired range of frequencies we wish to receive. By tuned, we mean that the signals passing through coil and capacitor networks are those between 3.500 and 4.00 MHz.

There are often two or three sets of coils and capacitors ganged or joined together to prove the bandpass desired. This is accomplished by having the values of each coil/capacitor pair slightly different from each other. Other frequencies are blocked or tuned out, and aren't passed through the network. The receive antenna is connected to the input side and the away side, or output is connected to the MIXER stage.

Having a tuned input is a good thing. While antennas are often designed to receive selected frequencies, they also receive a wide range of other frequencies. These additional frequencies, if allowed to pass, would have a negative effect on the operation of the receiver.

Thus far, the signal we desire to hear has

been intercepted by the antenna, passed through a tuned circuit called the RF INPUT, and made available to the input side of a MIXER circuit.

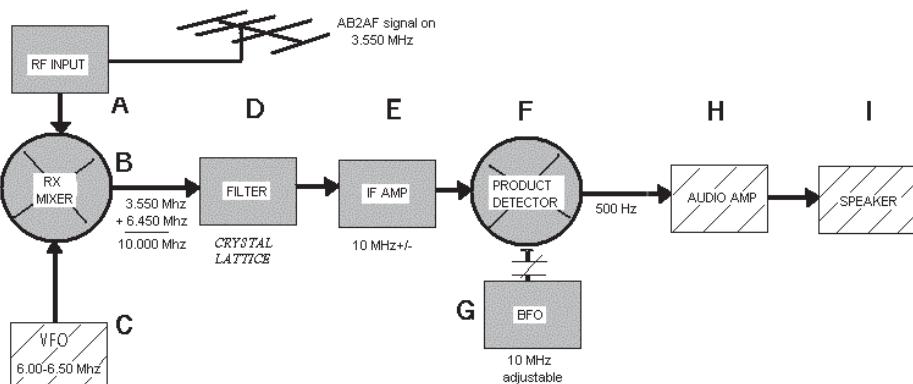
◆ Mixer Magic!

The output of the RF INPUT circuit is attached to a MIXER stage, shown as Block B. Mixers are commonly identified on a block diagram by a circle with an X through it. The MIXER has two signals feeding it, (1) the frequency we desire to listen to with its variations from being keyed at the transmitter, and, (2) the output from a VARIABLE FREQUENCY OSCILLATOR, Block C.

In the MIXER, these two signals are combined to form an output signal called the INTERMEDIATE FREQUENCY, or I.F. (Blocks D and E) It is the mixer's function to combine these two frequencies and provide a single usable frequency as an output.

Mixers are just what the name implies. They combine frequencies to provide an output. There are four desired output possibilities from a mixer: either of the two originals, and the sum or the difference of the two. For our receiver, we will use an I.F. of 10 MHz. This frequency is commonly used in QRP gear (low powered, often simple receivers and transmitters), and will be explained as we progress through the receiver's circuits.

Art's signal is being received on 3.550 MHz, is passed through the RF INPUT circuit, and has arrived at the input of the MIXER circuit. The mixer must provide a 10 MHz output to be compatible with the remainder of the receiver. Because the mixer has two input frequencies and one of them is 3.550 MHz, the



A "typical" receiver circuit. The arrows indicate the signal direction.

second frequency is to be supplied by the VARIABLE FREQUENCY OSCILLATOR (VFO), which in our example will be 6.450 MHz. This will enable the mixer to provide a 10 MHz output.

The VFO is a circuit designed to provide a signal to the mixer that is stable, accurate, yet can be varied by the operator. The range of the VFO is carefully selected to enable the mixer to use the frequency to provide an output that will be compatible with the remainder of the receiver's circuits.

For this example, the range of this VFO, to be compatible, will be from 6.000 MHz to 6.500 MHz. Using this range of frequencies from the VFO makes use of what is called the summing principle to achieve the required 10 MHz output. By adding the incoming signal frequency to that of the VFO, the 10 MHz frequency is realized. You could also use the difference principle, where the VFO would be designed to operate from 13.500 MHz to 14.000 MHz. This would also result in the 10 MHz output needed. Lower frequency VFOs are generally easier to design and operate, and are therefore more commonly used.

Suppose another signal is present on 3.510 MHz – 10 MHz from the low end of the band. You would tune the VFO to 6.490 MHz. The mixer circuit would combine the incoming signal on 3.510 MHz with the VFO signal on 6.490 MHz and provide an output on 10.0 MHz. The output of this receiver's mixer will always be 10 MHz, and have a bandwidth of a few kilohertz above and below the 10 MHz I.F. frequency.

Blocks labeled D and E are the I.F. FILTER and I.F. AMPLIFIER. D contains a bandpass filter designed to allow only the 10 MHz signal provided from the mixer to pass, and E is an amplifier to boost the signal strength. Often the I.F. FILTER is composed of a *crystal lattice network*. This is a series of crystals (in our case 10 MHz) and capacitors selected to allow only the 10 MHz signal to pass. The crystal frequency identifies the center frequency of the filter, while the capacitor values are selected to provide adequate bandwidth of the filter. CW filters are designed to be narrow, in the range of 750 Hz to 1,000 Hz, and SSB filters are in the 2 to 3 kHz range. While the crystals set the frequency that's allowed to pass, the filter will allow frequencies slightly above and below the crystal frequency.

Our signal has now passed through the I.F. FILTER and AMPLIFIER, and is present at the input of the PRODUCT DETECTOR, Block F. It has a new name, but it functions just like the mixer described earlier. It also has two inputs and one output, and can provide one of the four available frequencies as an output. The big difference here is that the PRODUCT DETECTOR is used to mix signals from the BEAT FREQUENCY OSCILLATOR (BFO), labeled Block G, and provides a low level audio output. The BFO works just like the VFO, but with one difference: It provides only one frequency output and is often crystal controlled.

The BFO in our example contains an oscillator circuit using a crystal identical to those used in the crystal lattice filter, 10 MHz. This

oscillator output frequency is fed to one of the two inputs of the product detector, and is mixed with the incoming 10 MHz signal from the I.F. Amplifier.

◆ Hey, Wait Just a Minute !

That's great, you say, but 10 MHz from the I.F. Amplifier and 10 MHz from the BFO gives me the following outputs: 10 MHz, 20 MHz, and zero. Where does the audio part come from?

Easy! Let's tune the BFO slightly off frequency by 500 Hz or so, using the variable trim capacitor in the circuit. Trimmer capacitors could be used to bring an oscillator's output frequency exactly on frequency. But in our case, we will use it to move the output frequency away from the 10 MHz product. Now the outputs from the product detector are 10.000 MHz, 9.9995 MHz, 19.995 MHz and 500 Hz. By using the difference of the two, a 500 Hz output is realized in the audio range, and is usable by the AUDIO AMPLIFIER, Block H that follows.

The process of adjusting stages of a receiver to meet the mathematical requirements of the sections is called the *alignment*. Alignment enables the sections to perform their function, while being acceptable to the remainder of the receiver's circuits.

The audio amplifier section increases the signal to a level great enough to drive the speaker or headphones, enabling the operator to hear the signals. The 500 Hz low level audio is connected to the audio amplifier using a potentiometer (variable resistor) called the volume control. It is often labeled GAIN on the front panel of receivers. Its function is to provide a control for the operator to regulate the amount of low level audio allowed to enter the audio amplifier, creating a comfortable listening level of audio.

Arthur's signal was processed or acted upon mathematically by the receiver's circuits. By careful manipulation of signals and amplification of the resulting products, we can convert a signal from far above the audio range to a sound reproduced by the speaker (I) and easily understood by human hearing.

There are many other circuits that can be incorporated in a receiver to increase its performance. Some of these are audio filters, notch filters, RF amplifiers, AGC (automatic gain control), 'S' meter (signal strength meter), and many, many more. These circuits, while not described here, are used to enhance the operation of the receiver. Add-on circuits are often called the "bells and whistles" of a receiver, and, while they are desirable, the unit could function without them.

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This is your equipment page. Monitoring Times pays for projects, reviews, radio theory and hardware topics. Contact Rachel Baughn, 7540 Hwy 64 West, Brasstown, NC 28902; email editor@monitoringtimes.com.

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How to Survive Any Storm!

(To the tune of "Bad Boys.") Bad storms! Bad storms! Whatcha gonna do? Whatcha gonna do when they come for you?

Long-time readers of this column know that your humble correspondent is a huge fan of NOAA weather radio. Most of us get our pockets tapped pretty hard by the government, and one of the best paybacks we get is a network of 480 FM transmitters that broadcast weather information 24-hours a day to fifty states, Puerto Rico, the Virgin Islands, Guam, and Saipan. Seven frequencies are used: 162.550, 162.400, 162.475, 162.425, 162.450, 162.500, and 162.525 MHz. Currently, an estimated 70-80% of the population is within range of a NOAA weather radio station.

If you don't have a weather radio receiver with alert capability in your household, you need one. Having said that, the point is not academic: what are you going to do when the alert squawks and you are suddenly informed that Something Bad is about to happen?

Fortunately Warren Faidley has the answer. Faidley is an internationally recognized extreme-weather expert and storm-chasing journalist who has written a new book called *How to Survive Any Storm – Severe Weather Handbook*. Faidley is one of the few people on the planet who has survived both an F-5 tornado and a category 5 hurricane. He habitually puts himself in the path of severe weather to capture images that all of us have seen on TV and in publications.

Before you decide that Faidley is in need of deep counseling and powerful medication: you should know this – he is not a guy with a death wish. Far from it; I have interviewed him, and he strikes me as (a) a very nice and knowledgeable person and (b) a fellow who loves what he does and wants to continue doing it. He's gotten himself into, and out of, more hairy severe weather situations than most of us will see in a lifetime. In short, his credentials for writing *How to Survive Any Storm* are impeccable. In the argot of the street, "He da man!"

How to Survive Any Storm (HSAS) is a 5.5 inch x 8.5 inch format book that runs 213 pages. It's divided into 25 chapters and five appendices, plus a short biography of Faidley. Chapters include: Storm Warning Systems, Storm Forecasting Data, Pre-Storm Planning, and Evacuations. Chapters five through 17 focus on specific threats: severe thunderstorms, flood and

rain storms, lightning, tornados, hurricanes, blizzards, hailstorms, wind, dust, fires and wild-fires, storm survival in a vehicle heat waves, and marine weather. The last few chapters cover post-storm survival, civil unrest and disasters, storm survival for kids, pets and storms, storm shelters, weather phobias, storm chasing and photography safety, and storm and disaster supplies and kits.

Unlike Faidley's first book, *Storm Chaser* (published in 1996), *HSAS* is not designed to be a sit-in-your-armchair-and-have-a-comfortable-read kind of book. Instead, *HSAS* presents a lot of information, often in bulleted form, so that it can be quickly and easily accessed when you need it in a hurry.

Having said that, it does make good reading. This is a book that you want to cruise through once when you get it, and then review relevant parts as, say, the winter storm season, hurricane season, or tornado season comes upon you. When a particular severe weather event is threatening – for example, a hurricane coming up the coast – you'll want to review the chapter on hurricanes, typhoons, tropical storms and cyclones and make sure that you are properly prepared.

The information that Faidley presents is down to earth and practical, and I can virtually

guarantee that some of what you read will surprise you. For example, most of us have seen the footage of a family taking refuge from a tornado under a highway overpass. Bad idea! An overpass can actually compress and accelerate the tornadic winds. The family in the video footage got lucky, but don't bet your life on duplicating their experience.

Here's another tip, from the chapter on storm and disaster supplies and kits that could easily be worth a thousand times what the book costs: "For insurance or theft purposes, videotape or photograph all valuables and store a copy in a back vault or other safe location away from your home." It won't save your life, but if a disaster destroys your home, you'll be able to document what you lost.

Bottom line, *How to Survive Any Storm* is absolutely jam-packed with information you need, because if you live on planet Earth, sooner or later severe weather will be coming to your neighborhood. I give this book my highest personal recommendation: it is a must-have.

You can get a copy by sending a check or money order for \$16.50 plus \$4.00 shipping to: Weatherstock, c/o Book Orders, PO Box 31808, Tucson, AZ 85751 or visit <http://www.stormchaser.com/bookorderform.html>.

Law, continued from page 8

case. However, the Judge on the case did not feel comfortable with a verbal dismissal.

Although New York law allows a Court to affirmatively dismiss a case just on the verbal authorization of a prosecutor or the Court's own recognition that no law was violated, Judge Hallett preferred that a record was made of how and why the case was dismissed. He directed the parties to provide him with a formal request for dismissal for him to rule on. Terry filed her request and a supporting seven page affidavit the next month.

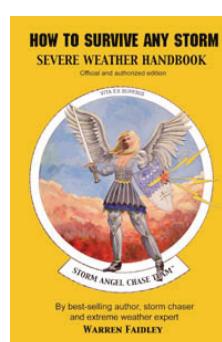
In it she cited several reasons why the law did not apply to Richard Lalone or the facts of this case. In addition to her argument that the state law did not apply here, Terry reminded the Court that federal law preempts the New York law in these types of matters.

◆ Vindication

On August 5th, Judge John Hallett issued the decision of the Court dismissing

the charge against Richard Lalone. In his opinion Judge Hallett noted that Section 397, the law controlling possession of radios that can receive radio signals used by the police in New York, "is probably the most poorly drafted section of the Vehicle and Traffic Law." Judge Hallett also took note of the "the exemplary service amateur radio operators have provided to the citizens of Jefferson County [where the case took place], notably during the microburst of 1995, the ice storm of 1998 and the terrorist attacks of 2001."

After months, the charges hanging over Richard Lalone were gone. His case underscores a simple, but important point that is often mentioned when "possession of a radio that can receive radio signals used by the police" is an issue. *If you are in an excluded class because you have a permit or federal license, carry a copy of the complete law in your vehicle in addition to a copy of your permit or license.*





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What's NEW

Tell them you saw it in Monitoring Times

New Tricks on the PRO-96

Thanks to a tip from Richard Newbould, *MT* learned that the Win96 scanner software for the Pro-96 written by Don Starr can open up nearly every frequency from 17.0-1300 MHz in this radio for reception! In Version 1.25 of the Win96 software, Don added an "extended frequencies" option which seems to enable some sort of hidden test mode that allows reception of the frequency ranges below. Frequencies are sent from Win96, or can be entered directly on the scanner's keypad (including in SR6 - Limit Search).

Some ranges (including cellular) still appear to be "blocked" by the scanner. Here are the ranges that seem to be "opened" using this feature in the software above:

17 - 25 MHz
54 - 108 MHz
225 - 406 MHz
512 - 550 MHz
764 - 806 MHz
960 - 1240 MHz

These extra ranges have fixed step sizes. Below 406 MHz the step is 5 kHz. Above 406 it is 6.25 kHz steps.

Original frequency coverage:
25 - 54 MHz
108-136.9875 MHz
137-174 MHz
216.0025-225 MHz
406-512 MHz
806-960 MHz (except cellular)
1240-1300MHz

But using the Win96 program software from Don Starr, your Pro-96 will now receive the following:

17 - 174 MHz
216.0025-550 MHz
764-1300 MHz (less cellular)

This is major news for scanner buffs and especially the Milcom crowd, as it now allows them to receive the 225-400 MHz military aircraft band on a Pro-96 scanner.

You can download a 15 day demo version at <http://www.starrsoft.com/software/win96> or contact StarrSoft.com, 781 Pomeroy Avenue, Santa Clara, CA 95051; don@starrsoft.com

Case for PRO-92/PRO-95

Scanner Master makes a custom-made carrying case which fits both the Radio Shack PRO-92 and PRO-95 scanner radios. [*File contains invalid data | In-line.JPG *] The case is manufactured with a thick, rugged leather which protects the scanner from both scratches and most falls. The case includes full keyboard access as well as cut-outs for the speaker, the DC power and PC programming jacks.



The Scanner Master PRO-92/95 case also includes a quick-release swivel unit. The swivel piece stays on your belt while you can turn the radio upside down and pull it, while in the case, off your belt. If the user is worried about the radio staying secure in the case, a quick-release bungee cord can be placed around the BNC jack at the antenna.

List price is \$32.95 from Scanner Master Corp., 40 Freeman Place, Needham, MA 02492; 1-800-SCANNER; <http://www.scannermaster.com>

Antenna Controller

The new MAC-200, the Master Antenna Controller from SGC, may be your answer to



multiple antenna matching. The MAC-200 allows you to control five antennas, three fed by coax, one with balanced line, and one random length line. The built-in antenna tuner provides a match automatically on all antennas. Check it out from SGC; retail price is \$319.95. SGC Inc., 13737 SE 26th St., Bellevue, WA 98005; sgc@sgcworld.com; 1-800-259-7331.

Garmin Geko GPS Receiver

The smallest, lightest, waterproof GPS unit on the market is appropriately named the Garmin Geko. With its sleek canopy-green case, the powerful but easy to operate Geko is perfect for the navigation novice. One touch waypoint function, 250 waypoint storage capacity, PanTrack function, PC connectivity. Four interactive games transform the outdoors to a virtual board game. Two AAA batteries provide 12 hours of operation.

The Geko 101 retails for \$114.95 from Scientifics, Dept A031-C999, 60 Pearce Avenue, Tonawanda, NY 14150-6711; 1-800-728-6999; <http://www.ScientificsOnline.com>

The Geko 201 model boosts



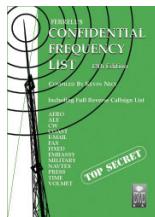
WAAS capability, adds a user-configuration trip computer, and 10,000 trackpoint storage for \$139.95. When you write or call Scientifics, ask for their new 100-page catalog of scientific and educational projects.

Confidential Frequency List

Published by PW Publishing and edited by Kevin Nice, the new edition of the *Confidential Frequency List (CFL)* is a great reference for the utility radio buff. This 13th edition has 586 pages, is perfect bound (not spiral like the last few editions) and was current through August 2003.

This book provides extensive coverage of the radio spectrum from 1605 kHz to 30 MHz, excluding the broadcast and amateur radio spectrums. The bulk of the book consists of a by-frequency listing of utility stations worldwide. There are listings for aeronautical, marine (coast), fixed stations, diplomatic networks, military, press, time stations and much more. In addition to voice communications, this edition also has expanded listings covering the expanding world of HF digital modes, including ALE (Automatic Link Establishment), CW (Morse code), HF E-mail modes, facsimile, NAVTEX and a lot more.

In addition to the by frequency listing, this edition of the *CFL* also includes a world time chart, abbreviation list, NAVAREA map, international allocation of callsigns, ICAO (International Civil Aviation Organization) and World Meteorological Organization (WMO) location identifiers, a reverse station list sorted by callsign, worldwide NAVTEX (Marine weather and safety broadcast) station list and GMDSS (Global Maritime Distress and Safety System) frequency list, and a major world aeronautical route areas (MWARA) frequencies and maps. The one major area of listening not covered by this publication is the world of numbers broadcast. But, if you like chasing signals outside the ham and broadcast bands, then the



What's NEW

Tell them you saw it in Monitoring Times

CFL is your passport to the world of utility radio listening.

The CFL sells for \$31.95 and is available from Universal Radio in Reynoldsburg, Ohio.

—Larry Van Horn

Police Call

Police Call Frequency Guide, 2004 edition, edited by Richard Barnett, is the 41st edition of the nation's favorite scanner directory, loaded with information for scanner radio enthusiasts. Each edition covers VHF/UHF land, sea and air frequencies in the frequency range from 30-869 MHz for the specific states as follows:

Vol 1 Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, Vermont

Vol 2 Delaware, Maryland, New Jersey, Pennsylvania

Vol 3 & 4 Illinois, Indiana, Kentucky, Michigan, Ohio, Wisconsin

Vol 5 & 8 Arizona, Colorado, Idaho, Iowa, Kansas, Minnesota, Missouri, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, Wyoming

Vol 6 District of Columbia, Florida, Georgia, North Carolina, Puerto Rico, South Carolina, Virginia, West Virginia

Vol 7 Alabama, Arkansas, Louisiana, Mississippi, Oklahoma, Tennessee, Texas

Vol 9 California, Oregon, Washington

***Note: There are no volumes that include listings for Hawaii and Alaska.

Each volume includes frequencies for public safety, railroads, forestry, aircraft, highways, transportation services, schools, news media, movie/TV production crews, security companies, rescue services, hotels, sporting events, public utilities, amusement parks and much more.

Listings are alphabetized by location, and include frequency, call sign, base or mobile class, and service. A by-frequency cross-reference allows the listener to look up the most likely source of an unrecognized transmission.

Each volume also includes a *Police Call* Version 5 CD-ROM that has the entire United States direc-

tory set (all the material from each of the regional volumes). On the CD are public safety listings by frequency, selected trunk systems data; business listings by state, Grove's Top 1000 Shortwave Frequency list. The information in these listings come directly from databases on the CD.

Maps of various public safety jurisdictions is also on the CD. Additional material on the CD is in Adobe portable document files (PDF) format for use with an Acrobat reader. These additional listings (not taken from the database) include a sampling of U.S. government frequencies; a railroad and aircraft frequency list; the consolidated frequency list; code and signals; glossary of terms and slang; auto racing frequency data; and listings of various FCC radio services (most of which no longer exist after the FCC reformed the VHF/UHF bands).

The CD is easy to use, and the operational problems experienced in earlier versions appear to have been worked out. It should be pointed out that from the browse portion of the CD, data from the main frequency databases cannot be printed out. All of the PDF files can be printed, but several that we tested were so light they were scarcely readable.

The consolidated frequency list is intended as a reference frequency list for the VHF/UHF land mobile spectrum, showing the type of service allocated for each frequency. It is quite useful for picking search ranges for new listening targets, but several problems were found with frequencies being out of numerical order. Hopefully this useful tool will be improved in the next version of *Police Call*.

While the most important sections of this year's edition have been brought up to date, some of the generic lists are getting very long in the tooth, as mentioned in last year's review. The FCC's rearming of the spectrum is mentioned, but the actual extensive frequency additions on some of the lists are not reflected, including the new railroad and marine band plans. In the aircraft listings many of the frequencies are not identified as to usage and some of the material is out-of-date. The military/government listings need to be completely scrapped. In addition to

inaccurate information, there are still listings for bases that have been closed by the Department of Defense, as previously pointed out in last year's review.

But with all this said, the *Police Call Frequency Guide* remains the leading source of scanner frequency listings on the market, and with good reason. Its accuracy remains high, especially considering the rapidly-changing VHF/UHF spectrum assignments.

A *Police Call* directory for your region is available for \$19.95 plus shipping (*Monitoring Times* subscribers get free shipping) from Grove Enterprises (7540 Hwy 64 West, Brasstown, NC 28902; 800-438-8155; <http://www.grove-ent.com>).

—Larry Van Horn

Passport 2004

For twenty years, *Passport to World Band Radio* has been a popular publication among beginning and advanced listeners. The 2004 edition, published in October 2003, celebrates *Passport's* 20th anniversary. Larry Magne, Editor-in-Chief, begins this year's edition by reflecting on the first issue and the challenges of early technology available at the time.

Since those early and unsure days, Magne and his dedicated staff have expanded their coverage to become an authoritative source for enthusiasts.

At a glance, *Passport's* "blue pages" contain graphical listings of stations in by-frequency order, which is advantageous for bandscanning – to a point. Unfortunately, as seasonal frequencies adjust, much of *Passport* – as with other annual radio publications – becomes out-of-date, except for domestic services or those frequencies that rarely change. This is most likely unavoidable; however, it remains a weakness in an otherwise fine publication.

As usual, a large portion of *Passport* is devoted to reviews on shortwave receivers and antennas in all price ranges. This will assist those DXers looking for a professional or

nonprofessional receiver.

The "Addresses Plus" section contains by-country listings of a station's key personnel, mail addresses and Web addresses. This is without question a great asset to those wishing to correspond with the station.

Passport remains a favorite of hobbyists for frequencies, listening advice, and receiver reviews. It is a wealth of information, at an affordable price. *Passport To World Band Radio 2004* is available for \$22.95 through Grove Enterprises at <http://www.grove-ent.com> or 828-837-9200.

—Gayle Van Horn

Product Updates

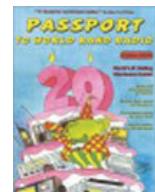
Mayah DRM2010

John Figliozzi reports that "Probably as no surprise to anyone, the Mayah DRM2010 is having trouble getting off the ground." The following information is from their North American distributor:

- 1) There have been no shipments... the product is not ready
- 2) Estimated now for end of January 2004 production (problem with component suppliers)
- 3) The target price for the USA is still US\$850.00

PRO-2054 and PRO-2096

It is rumored that Radio Shack will have two new scanners in the very near future, the PRO-2054 and PRO-2096 models. This is based on information being sent to Radio Shack stores. It is anticipated that they will be compatible with the PRO-96, in much the same way that the PRO-2053 was compatible with the PRO-93, from an external software perspective.



Books and equipment for announcement or review should be sent to "What's New?" c/o Monitoring Times, 7540 Highway 64 West, Brasstown, NC 28902. Press releases may be faxed to 828-837-2216 or emailed to Rachel Baughn, editor@monitoringtimes.com

A Hint to NOAA

As we have occasionally mentioned during recent months, European amateur weather satellite (WXSAT) monitors had never expected to be able to receive the high resolution image stream (HRIT) from the geostationary European WXSAT METEOSAT Second Generation (MSG)-1 without having to buy extremely expensive receiving equipment. At best, we had been wondering about justifying the cost of buying LRIT reception equipment to receive the new *Low Rate Information Transmission* image stream, the equivalent of second generation wfax.

LRIT is itself excellent, but we unexpectedly found ourselves being able to receive HRIT (as well as LRIT) for the cost of a near-standard, small dish satellite television system, together with some moderately-priced software to decode the new format images. My own system now returns 12-channel high resolution images every 15 minutes, together with images from GOES-10, GOES-12, GOES-9, and Meteosat-5 (located over the Indian Ocean).

This is all as the result of the failure of an amplifier on MSG-1. Because it became distinctly possible that activation of further amplifiers onboard MSG-1 might endanger the mission, the decision to find another way to disseminate the image stream to end-users had to be found. This was achieved by expanding the already existing dissemination of other meteorological data using a commercial communications satellite – HotBird-6. The end result is that European end-users now need only buy the system mentioned, together with additional software – and they can receive an unbelievable flow of superb imagery.

This leads me to wonder whether there is any possibility of NOAA (the National Oceanic and Atmospheric Administration) making a decision to follow this direction? Might they investigate possible dissemination of the new LRIT (and/or possibly HRIT) digital data stream via a communications satellite transponder – thereby cutting the cost of reception by an order of magnitude – making the data potentially available to a huge number of people? Food for thought.

❖ Weather Satellites - future plans

Last month I started a feature about long-term plans for changes to the constellations of satellites that will eventually become the constellation of the Initial Joint Polar System. The plans began with the decision to merge the DMSP satellites with the NOAA satellite program. As an early step in the convergence pro-

cess – designed to bring the two systems together to produce the NPOESS (National Polar Operational Environmental Satellite System), Satellite Control Authority for the existing DMSP satellites was transferred from the U.S. Air Force Space Command to the NPOESS Integrated Program Office in May 1998.

Command, control, and communications functions for DMSP satellites were combined with the control system for NOAA's current (POES) satellites at NOAA's Satellite Operations Control Center (SOCC) in Suitland, Maryland. These satellites are now being controlled by civilian personnel at the SOCC. A backup satellite operations center, manned by USAF Reserve personnel, was established at Schriever Air Force Base, Colorado. The inter-agency effort has provided state-of-the-technology satellite control equipment and resulted in significant budgetary savings, as well as uninterrupted service to end users.

The first NPOESS satellite is expected to be available for launch in the latter half of the decade, approximately 2008, depending on when remaining POES and DMSP program satellite assets are exhausted. NPOESS will provide significantly improved operational capabilities to satisfy critical civil and national security requirements for space based, remotely sensed environmental data.

The satellites will deliver higher resolution and more accurate atmospheric and oceanographic data to support improved accuracy in short-term weather forecasts and severe storm warnings. It will also serve data continuity requirements of the climate community for improved climate prediction and assessment. NPOESS will also provide improved measurements and information about the space environment necessary to ensure reliable operations of space-based and ground-based systems, as well as continue to provide surface data collection and search and rescue (SARSAT) capabilities.

In November 1998, NOAA entered into an agreement with the EUMETSAT (European Organization for the Exploitation of Meteorological Satellites) to participate in the Initial Joint Polar-orbiting Satellite System (IJPS). The agreement calls for cooperation between NOAA and EUMETSAT to provide meteorological data for 'Morning' and 'Afternoon' orbits by complementing each other's polar satellite global coverage. Under this agreement NOAA will also provide some of the instruments on-board the EUMETSAT satellites.

The Initial Joint Polar System will comprise the continuation of the current NOAA satellite



Fig 1: GOES-9 (GMS) November 28 0300UTC (a EUMETSAT 2003)

Images from GOES-9, located over 204° west longitude, are now added to the LRIT data stream.

series with NOAA-N and -N', together with the new EUMETSAT satellite series Metop-1, -2, -3, the first of which is due for launch in 2005. The satellites will be produced independently by the USA and Europe respectively but will carry a core set of nearly identical instruments to ensure operational data continuity and coherence of the key meteorological observations. My thanks to both EUMETSAT and NOAA for making the information available.

❖ WXSAT Equipment suppliers

I welcome information from any manufacturer who supplies equipment for the hobbyist weather satellite market, so if you have information, please pass it to me! I spotted a notification from Timestep to the wxsat-1 mailing list concerning their forthcoming equipment readiness for the American LRIT market. They are providing (or are about to provide) two systems: one for the professional user, and one aimed at the hobbyist.

Timestep LRIT Professional

0.9m dish, Wilmanco feed and downconverter, Quorum DSP receiver, DB1 PC Interface card, Timestep DB1 'lite' software, \$7,500 availability: now.

Timestep LRIT Consumer

0.9m dish and feed, 0.5dB NF preamplifier, Timestep LRIT receiver, Timestep DB1 'lite' software, Timestep USB Interface, \$2,999 Availability: estimated May 2004.

Frequencies:

NOAA-12 and -15 transmit APT on 137.50 MHz
NOAA-17 transmits APT on 137.62 MHz
GOES-10 (west) and GOES-12 (east) use 1691 MHz for WEFAX. GOES-12 currently transmitting LRIT data at 45 minutes past each hour.

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MARS - A Different Perspective

By Dino Papas, K10S/AAT3BE/AAA9TC
Colonel, U.S. Army Retired
Army MARS National Training Coordinator

Kudos to Larry Van Horn (*Closing Comments* October 2003) for continuing to take to task the U.S. Armed Forces Military Affiliate Radio System (MARS) programs. Larry's unique position as a retired sailor, author, assistant *Monitoring Times* Editor, utilities monitor and non-MARS member allow him to make outside assessments of the progress MARS has made over the years and express them to a wide audience.

Let me present the readership of *Monitoring Times* another perspective of the MARS program. As a retired soldier with 26 years of active service, a ham for 34 years, and Army MARS operator, I can offer that the program is continuing to prosper and transition to significantly different missions and horizons.

The service's MARS programs have seen a significant refocusing of their priorities in the last few years. Morale and Welfare message support for servicemen overseas, once the mainstay of MARS operations, has decreased significantly with the advent of inexpensive telephone calling cards and e-mail/internet access for soldiers serving overseas. But for those soldiers deployed to areas of the world where these facilities are not available, the MARS program may be their only expeditious means of maintaining contact with home.

Today, emergency situation reporting and communications support to the services during natural and man-made disasters and a new expanding role in Homeland Security are now the most visible and evolving driving forces for MARS. Frankly, many public exclamations of MARS as a "dying program" are from long-time or former MARS members who continue to resist this fundamental shift to emergency situation reporting and communications support to military organizations and other emergency response agencies. This transition period will last several years as new priorities, expanded training and new emergency operations procedures are inculcated into members, both new and old alike.

The most important MARS customer is the Joint Director of Military Support (JDOMS) in the Pentagon. During presidential declared disasters JDOMS authorizes and coordinates federal military support to states requesting it. MARS operators provide valuable disaster situation information directly to JDOMS using the Essential Elements of Information (EEI) reporting system. JDOMS uses this information along with that gathered from other sources, to make decisions on how best to provide needed support.

In the disaster zone the Defense Coordinating Officer (DCO) works for and with FEMA to coordinate federal military support to relief operations. During my final Army assignment at Fort Bragg, NC, I was the DCO during Hurricane Floyd in 1999. The information provided to JDOMS by MARS operators assisted in the planning and execution of DoD support to North Carolina and other states. I can't think of a better example of a MARS success story. The information I received from JDOMS was worth its weight in gold to me as the soldier on the ground...hard to put a price tag on that.

More and more agencies are recognizing the value of MARS. For example, during Hurricane Isabel, in addition to EEI reporting, MARS was asked to provide points of contact to several military units and response agencies to assist in ensuring the continuity of their communications. Ultimately that support was thankfully not required but the MARS system was prepared to supply it.

Having said all that, the MARS programs do have their problems. The good news is that those problems are identified and being addressed. Larry points us to areas identified by the Army's Inspector General (IG) that, at face value, speak to significant issues – what's missing are the responses to those concerns. Having commanded Army units from platoon through brigade, my experience is that IG observations usually require more analysis to substantiate their validity, identify root causes and develop good problem solutions. Issues of "non-support" and "customers unaware of MARS capabilities" must be explored to find systemic problems which are often the result of customers in fact being aware of the capability but choosing not to take advantage of it.

A similar analogy is amateur radio communications support during emergencies. Larry points out the successes of amateur radio – yet we continue to hear the same kinds of "complaints" about agencies unaware of the potential for amateur radio support or reluctant or unwilling to use it. Should we do away with amateur radio as a waste of taxpayers dollars? Of course not; as hams we keep working at it.

On balance, to those hams interested in a more structured and rewarding way to assist in the security and well being of our nation and in providing support to the servicemen and women of our armed forces, I'd recommend joining MARS. Be part of the solution – the Army MARS program has been and remains a valuable asset to the nation, the Army and its soldiers.

I recently delivered a "MARSgram" to a young soldier from his wife, another soldier serving in Baghdad, Iraq. The soldier, just back from combat tours in Afghanistan and Iraq himself, was very appreciative of our efforts. I, too, had been in the same situation when my soldier wife was deployed to a combat zone and knew how important keeping in contact was. We prepared a reply message that was on the MARS digital circuits in short order back to Iraq. The joy I heard in that soldier's voice as he received good news from his wife made it all worthwhile. To those who believe resources dedicated to the MARS programs aren't worth it I can only say I wish they had been on the phone along with me as I observed that it is in fact worth every penny.

The potential value added of the MARS programs is significant. One way to ensure we have the best program possible and to correct problems, real and perceived, is to work from within the system. It's a volunteer organization...if you don't believe it's for you please find other ways to channel your efforts to support our nation. Take what you hear and read about MARS with a grain of salt, find out more about MARS and make an informed decision for yourself.



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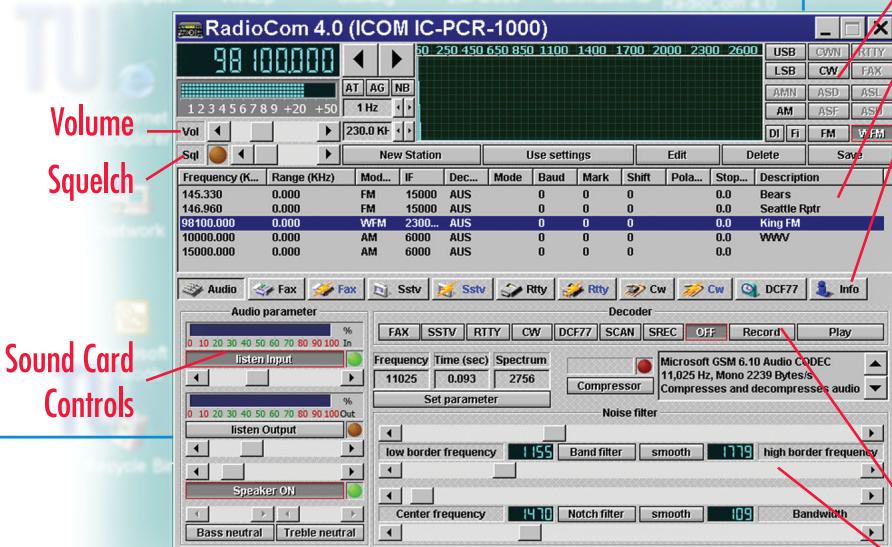
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Digital Decoder/DSP Functions
Filter Softening

100 kHz – 1.3 GHz[†]
AM, FM, WFM, USB, LSB, CW
Unlimited Memory Channels
Real Time Band Scope
IF Shift
Noise Blanker
Digital AFC
Voice Scan Control
Attenuator
Tunable Bandpass Filters
AGC Function
S Meter Squelch
CTCSS Tone Squelch
Computer Controlled DSP

Turn your PC into a Wide Band Receiver! ICOM's IC-PCR1000 uses the power of your computer to open a new world of listening and viewing pleasure. Compatible with most PCs and laptops running Windows™ software, the 'PCR1000 connects externally—in just minutes! The new Bonito software (BON CS40) expands and enhances the 'PCR1000's versatility with the following features:

Basic Radio Control functions with spectrum scope

Computer Controlled DSP for tailoring your audio with separate bass & treble controls

Filter Smoothing for the upper and lower ends of the audio spectrum

Notch Filter reduces annoying pops, buzzes, & other interference for a crisp, clear signal. Use the power of your computer's sound card DSP to bring out the beauty of the signal for hours of enjoyable listening

Digital Decoding Package transforms your computer into a decoding machine. You no longer have to purchase an external decoder for receiving non-encrypted digital modes. Digital Decoding allows you to decode: **RTTY, FAX** with Zoom, Synchronize, Slant Correction, Cut a Picture, Picture Invert and Rotate, **CW, SSTV** with Auto Sync, Slant Corrections, SITOR-B, PSK31

Audio Record function allows you to record your favorite radio programs, local traffic, or almost anything else with your computer's sound card and hard drive. Save for friends and family to listen at a later time

See your authorized ICOM dealer for more details.

www.icomreceivers.com

New Windows™ OS? No problem! Updated ICOM software is now available for free download! Download at www.icomamerica.com. Click Receivers>IC-PCR1000>IC-PCR1000 software (updated)

[†]Cellular frequencies blocked; unblocked versions available to FCC approved users.

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The world is waiting

www.icomamerica.com

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